

Foreword

As I look back on the past five years, and what we've accomplished, I find I'm a little closer to understanding how the Wright brothers felt that day at Kitty Hawk, how Roger Bannister felt when he broke the four-minute mile, or how Neil Armstrong felt when he made that "one small step." They all did what most people at the time considered impossible, but which we now take for granted.

However, none of these people performed their remarkable feats entirely on their own. To one degree or another they were each part of a group effort, and their accomplishments were the culmination of an ongoing process of accumulated theory and practical experience, of trial and error, of success and failure, of careful planning and flawless execution.

We're not inventors, rocket scientists, or long-distance runners. We're railroaders, in business to meet the transportation needs of our customers. However, since most of us also happen to love railroading, we want to be the very best at what we do. To achieve this we must be endlessly inventive, rigorously scientific, and obsessively performance oriented. Moreover, we must all share the same goal and pull together.

Although railroading is in our blood, we aren't in the business just for the fun of it (although there's no rule that says we can't have fun along the way). We're in it to make a buck, to turn a profit on the resources entrusted to us by our shareholders; therefore, we expect to be compensated for the service we provide. And the more

efficiently and safely we do our jobs, the higher the quality of service, and, as a direct consequence, the greater the profits.

That's all very inspiring, you might say, but how do we go about accomplishing this?

It's no big secret, really.

First, commit to precision railroading, and the five guiding principles of Service, Cost Control, Asset Utilization, Safety, and People, so that we all share the same fundamental objectives and don't work at cross-purposes.

Second? Well, there is no second. That's it.

Disappointed? Hoping for a more definitive set of "how-to" rules, a handy Solution Encyclopedia where you look under "C" for congestion, "S" for snow, or "M" for meltdown? Sorry. No such thing. Precision railroading is not a tidy set of rules. Precision railroading is a way of thinking.

That's why this book is built around real-life stories. We can't give you ready-made solutions for the management problems you face and for which you're accountable, but we can offer insight and inspiration.

Home runs are great, but in the long run we accomplish more with base hits. Lots of small advances are more powerful than you'll ever believe. It's a team effort, which is why your contributions matter so much.

And it's a whole lot more fun to be on a winning team.



E. Hunter Harrison
President and CEO, CN

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*Screw You
Tommy*

Introduction

What this Book is About

This book is about running the best damn railroad in the business. Being the best, whether in sports, the arts, or business, demands whole-hearted dedication to our task and flawless execution of it. We know it's not easy. In fact, it's damned hard, much harder than being second best. We know we can do it, though, because we've been doing it. And we're going to keep on doing it, getting better and better as we go along. Consider it a work in progress.

The goal of this book is to explain the philosophy that guides our business model. It's not a how-to book, though, or a "Solution Encyclopedia." It's a map that traces the route from where we were to where we are to where we want to be. It's an interesting and enlightening journey. Along the way, you'll hear from some of the people who helped draw the map, who saw the way things were being done, didn't like what they saw, and took the initiative to change them.

CN's operating philosophy and the people who make it work are the forces that will carry us forward into a future that just might change the industry.

It's not a philosophy hatched in a boardroom. It won't crumble at the first encounter with reality. Quite the contrary, we've already faced reality, and through creativity, hard work and persistence, changed it.

Anyone can do it. How? Understanding why we work this way is the first step, learning how to do it is the second step, and sticking with it, day in and day out, are the subsequent steps that carry us ultimately to our goal.

We've organized this book to help you understand all the factors that go into running the best railroad in North America. Some of the material is common to any large commercial enterprise; some of it is unique to the railway industry. All of it matters, because it shows us a better way of working, of being the best in class, of leading the way for an industry that has not lived up to its potential – yet.

6 "CN is to freight rail-roading what Michael Jordan is to basketball and Tiger Woods is to golf," wrote Morgan Stanley rail analyst James Valentine.

World's Best: Worst to First in 10 Years, Trains Magazine, 2001

Where We're Going

Here is the general outline of what we'll cover in this book:

Part 1

- **CN's Guiding Principles**, looks at the five pillars of our business philosophy: Service, Cost Control, Asset Utilization, Safety, and People. CN is people, dedicated to serving our customers, controlling our costs and managing our assets so we can meet our customers' needs and still make a profit, at the same time providing a safe, challenging, and rewarding work environment.

Part 2

- **We Are All Precision Railroaders**, looks at who we are and why we do what we do. In other words, how the five guiding principles apply to everyone who works for CN, not just the people who run the trains. We'll also see how each of us, whether we work for Operations, Sales and Marketing, Information Technology, Finance, People, or Public Affairs, contributes not only to CN's success as a business, but to the community in which the company, and the thousands of people who work for it, lives.

Part 3

- **How a Railroad Works**, looks at two main components of the railroading business: its operational characteristics and its economics. A Class 1 railroad is an incredibly complex operation. CN has over 23,000 employees orchestrating 2,100 locomotives and 121,000 cars across 19,300 route miles of track.¹ Run a tight ship, and you can expect a reasonable return; manage it badly, and the sheer weight of your assets will sink you.

¹ Including BC Rail and GTL.

Part 4

- **The Service Plan**, describes the set of processes that shapes our day-to-day operations. Simply put, it's our commitment to our customers to do what we say we'll do – get their goods from A to B within a specific timeframe and cost. Underpinning the Service Plan are several closely interconnected service design principles and measures that ensure the most effective execution of the plan.

Part 5

- **Upward/Downward Spirals**, brings us to the fork in the road. When a railroad lacks a clear understanding of what it's all about – meeting its customers' transportation needs in an efficient, reliable, and safe manner – it loses focus. More often than not this lack of focus results in a sloppy, inefficient operation. Costs spiral out of control. Revenues plummet. On the other hand, when a railroad is focused on the right things, positive results reinforce and reward behaviors that produce even better results. Each time around, we become more confident in our abilities, more opportunities for improvement arise, and goals that once seemed beyond our reach are suddenly attainable.

Part 6

- **Where We Go From Here**, proposes a number of *What ifs...* What if every railroad on the continent embraced the same business model and service design principles that shaped CN? What if inter-continental traffic ran as seamlessly across different roads as our own trains run across our internal divisions? What if we, as an industry, improved our service performance to the point where we could regain even half of the customer traffic we've lost to trucking in the past 30 years? An unrealistic vision? We don't think so.

Part 1

CN's Guiding Principles

How to succeed in business

Success in any business depends on highly motivated people managing valuable assets to deliver safe and reliable customer-focused service while conscientiously controlling costs.

Introduction

CN has five guiding principles that form the foundation of everything we do. They are:

- Service,
- Cost Control,
- Asset Utilization,
- Safety, and
- People.

They do not change over time. They are constants in our planning and our operating decisions. They are both the business and cultural context of our company. And they apply to everyone in the company, not just the people who run the trains. Everyone, from the mailroom to the boardroom, from the diesel shop to the signals shop, from the marshalling yard to customer's siding, has a critical contribution to make.

These principles are also closely interrelated. You can't talk about one without invoking the others. More important, whatever you do in one area – succeed, fail, or maintain the status quo – ultimately affects the others. The good news is that success in one area often creates opportunities in other areas, beginning a positive upward spiral, each success leading to more success.

This part of *How We Work and Why* describes CN's five Guiding Principles and how they are interconnected and interdependent. As we explain and elaborate upon these principles, you'll quickly see the key role that finely-tuned processes play, particularly in how they support the principles of cost control and asset utilization.

The critical link between principles and processes is people. As we work our way through these five guiding principles, we'll get to People last. Not because it's the least important of our guiding principles. Far from it. Everything we do depends on people making it happen. It's CN's people, doing their jobs with passion and integrity, that makes us what we are.

Service

“Every company’s greatest assets are its customers, because without customers there is no company.”

Michael LeBoeuf, *Business Writer*

In the beginning was the customer...

If you don’t buy into that, you’re missing the whole point. Our business is our customers. Without them, there wouldn’t be any business. We make a commitment to a customer because we recognize the opportunity to make a profit for our shareholders. If we don’t think we can make a profit, we don’t make the commitment.

However, our customers are in business too. They have their own customers. So we have to be as valuable to our customers as they are to us. It’s up to us to provide the service the customer expects. This is just good business, good for the customer and good for the shareholder.

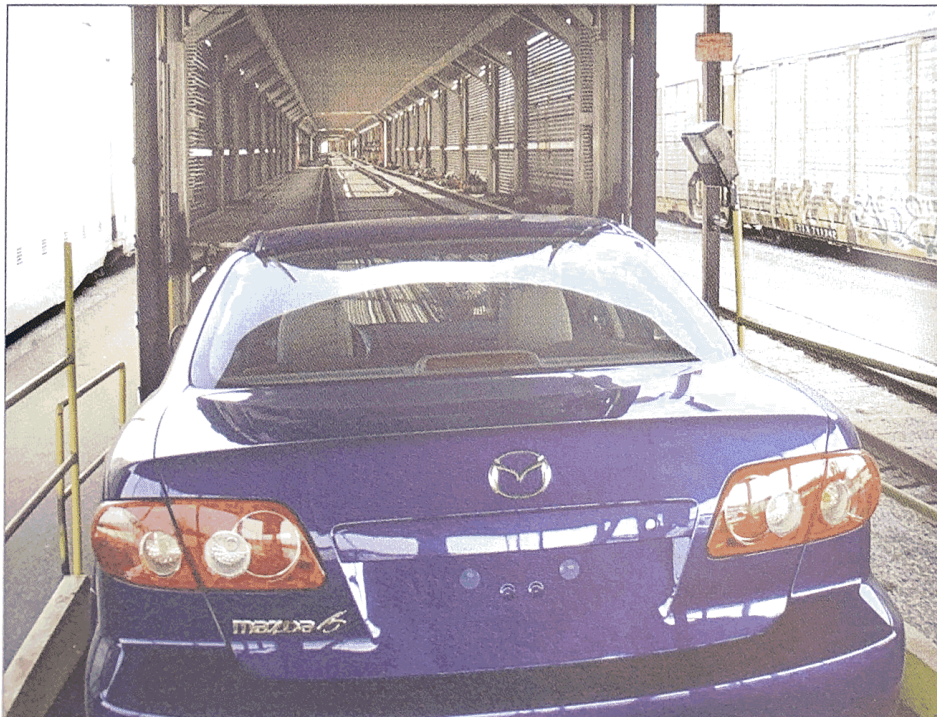
Once we’ve made a commitment to a customer, it all comes down to doing what we say we’ll do. If we say we’ll deliver their

Guiding Principle #1

Service

Service means doing what we say we’ll do.

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goods on time and undamaged, we'd better do just that or they'll take their business elsewhere. If we consistently provide service that meets their needs, they'll willingly pay for it. Being a good service provider isn't always easy, but makes for satisfied customers.

When we fail, there's a domino effect for our operation, for the customer, and for the customer's customer. Poor service is remembered and drives away revenue. And as you'll see later, poor service can also increase our operating and capital costs.

And when we fail, and from time to time we will fail, we can't blame "the other guy." We have to act with integrity, take responsibility, and work with the customer to make sure the same mistake doesn't happen again.

No matter what your job, it all comes down to serving the customer. Everyone in CN is part of the process of selling, delivering, and collecting on our service. While account managers and train crews interact directly with customers on a daily basis, equally important are the track engineers, car and locomotive mechanics, and information systems specialists – just a few of the many people who contribute to CN's commitment to serving the customer. Even if you do not serve the customer directly, you support someone who does.

Service – The Basics

Take any customer and ask yourself, "Am I providing good service?" Customer service is a chain of events that runs from the darkest corner of the Information Technology department to the customer siding. Here are a few suggestions on what you can do to ensure you are meeting your service commitments:

- Know your customers, internal and external. When we say "customer" we don't mean just the people who ship their freight with us.
- Don't assume you know what your customer wants. Ask. Listen carefully to be sure you understand. If their demands are unrealistic, for either cost or operational reasons, explain why and explore alternatives. In other words, you might have to say no to a new customer or to an existing customer who wants a new service.

- Spell out your commitment, then do what you say you'll do. If you promise to deliver on time, you owe it to the customer to do everything you can to keep that promise. However, if for some reason you can't deliver on time, act with integrity. Be honest, take responsibility for the failure, then work with the customer to find a solution.
- Ask for feedback. If the response is positive, you've got a winner – do more of that. If lukewarm – or worse, negative – ask what you can do to improve. Listen carefully. Act on what you learn.
- Don't ever leave a customer hanging. Don't be perceived as a black hole into which requests or comments disappear forever, that provides no information, no service.

"CN's philosophy has been 'what's good for our business is good for the customer,' and we are more likely to use their service more," said Mike Scherm, director of logistics and customer service for BP Solvay Polyethylene North America, a major plastics manufacturer.

Get with the Schedule, John Gallagher, Traffic World, 2004

Stories from the Field When the Levee Breaks

Serving the customer, doing what we say we'll do, isn't always easy. In fact, just when you think you've got it under control, reality rears its ugly head and tries to wash you away. Let's listen to Jerry Peck of Harvey, Illinois, as he tells us how he and his team dealt with a major service disruption.

Nineteen ninety-seven was a hellish summer in Memphis. We were struggling to keep up with heavy and growing traffic flows. Our performance stats were okay, but we needed everything to work in our favor. Not much chance of that. For one thing, we'd shifted from yard assignments to road switchers, a major operational change, and were experiencing significant disruptions as we



VOICES

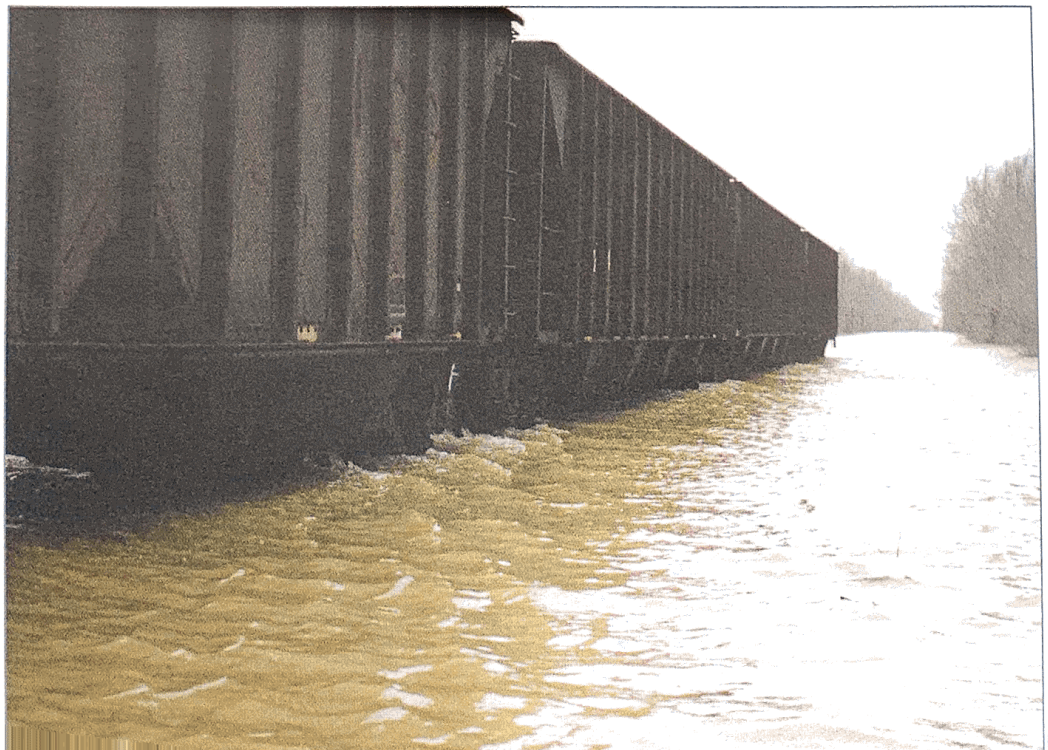
Jerry Peck
Harvey, Illinois

shook down new procedures. Then we had a derailment that took out a bridge, which required weeks of detouring while the bridge was rebuilt.

Early September we were just beginning to recover and our stats were finally moving in the right direction again. We cautiously resumed sleeping. That's when a levee broke in Obion, Tennessee, and we got a brand new lake smack in the middle of our 900-mile, single-track system. Man, that was a lot of water. More than a mile in diameter, as far as you could see in any direction, and nine inches over the top of the rail. And nowhere for all that water to go. Trains were backing up fast in both directions.

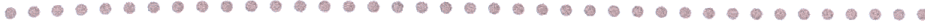
Our engineering folks took to rowboats, probing and assessing the state of the ballast. Miraculously, the roadbed was intact. But there was zero chance of even walking a locomotive through it without stalling.

Memphis was the center of the IC universe. Having most of the railroad stand down for even a few days was not an option. We had one way out. Take a very long train into the nearest siding. Cut the power and run it around to the other end. Then slowly shove the



train through the lake to locomotives waiting on the other side. Given the number of trains we had parked north and south, we quickly got very good at this maneuver. That's how we kept the railroad going. Several days later the water had dropped to three inches above the rail and Engineering gave us the okay to move locomotives through. Mr. Harrison came to Obion and rode the first southbound locomotive through the flood. He was kind of proud of our achievement and so were we. We were counting our blessings long before the Thanksgiving holiday rolled around because, as bad as that year had been for us in Memphis, it could have been a whole lot worse.

Bottom line is, you've got to serve the customer. Even with the best operating philosophy and the best service plan, you've got to make it happen, you've got to do what you said you'd do.



On the one hand is the customer. On the other is the shareholder. In between, we maintain the balance.

Cost Control

Our second Guiding Principle is Cost Control. It is not to be confused with cost cutting. *Cost control* means the right (and tight) management of all expenses, both short-term day-to-day operating expenses and long-term capital expenses. *Cost cutting*, as it's too often applied, means reducing expense regardless of the consequences.

Cost control is a long-term, ongoing process. Cost cutting is usually a short-term one-time event that as often as not has unintended, unexpected, and usually undesirable consequences somewhere else in the system, creating problems for someone else and ultimately increasing costs. For example, if a train is scheduled to depart only two-thirds full, one might consider canceling it to save the fuel and crew costs. Although it would appear to save money in the short term, canceling that train is just the beginning of a sequence of events that ultimately ends up costing a whole lot more. We'll see how later.

Cost control focuses on executing finely tuned processes in synch with other equally finely tuned processes. Continually refining processes to achieve higher degrees of precision yields a more efficient operation. Process improvement means finding, isolating, and reworking defects in the process. Doing it right the first time (or at least the next time) ensures a smooth process, removes disconnects and defects, reduces assets, and squeezes unnecessary costs out of the system.

Process improvement demands that we overcome our own inertia. We can't be content to do things the way they've always been done. A common mistake in a mature industry is allowing ways of doing things to become institutionalized, accepted without question. For example, how many times have you heard stories about managers trying to make new information technology fit old ways of doing things instead of using the new technology to redesign the processes to remove transactions, reduce bureaucracy, and, ultimately, lower costs?

Guiding Principle #2

Cost Control

Cost control is achieved through continually fine-tuning processes.

Cost Control – The Basics

Take any process in your part of the operation. Chances are some things don't work the way they should. Ask yourself, "Are those inefficiencies the root causes of unnecessary expense, lost revenue opportunity, or both?" If so, what can you do about it?

Here are a few suggestions on what you can do to exert greater cost control through process improvement:

- Examine every process, not only to see how it can be improved, but also to determine if it is even needed at all (see *Process Improvement*, page 22).
- Continually refine the processes under your control. Doing it right the first time always costs less.
- Base your actions on what your customer tells you is time and money well spent and what they are willing to pay for. Redirect your energy to the things that count and eliminate those that don't.
- Don't tolerate recurring defects and problems. Trace them back through the relevant processes to their root causes and fix them.
- Remember that the experts are the people closest to the details. Ask for their suggestions, remove any barriers to action, and let them streamline their own processes.
- Share your improvements with your colleagues. What has worked for you may also work for them.

Never lose sight of the fact, though, that yours is but one part of a complex collection of interdependent parts that make up the total operation, that any action you take may have unanticipated consequences somewhere else down the line.

Stories from the Field

The Pain and the Glory

We don't have to be reminded that money doesn't grow on trees, but we know that every commercial enterprise has a budget for justifiable capital expense. What do you do when you face an operational problem whose only solution seems to lie in building something to fix the operation? Here's Bill Sheehan of Homewood, Illinois.

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The ninety miles of track between Baton Rouge and New Orleans is a dense corridor of chemical and other industries. Some years ago we had a classic good news/bad news situation. Under scheduled railroading, car cycle times had improved so much that our customers, who owned their own cars, had to have someplace to park their excess equipment. Additionally, many of our customers were expanding production. Consequently, our yard at Geismar was becoming increasingly congested with these parked cars and heavier traffic flows.

We had a plan to expand the yard by two or three tracks, and had already graded the roadbed, when we got a call from Hunter Harrison. He began asking questions about the expansion plan, and his questions probed deeper and deeper into our operation. Eventually, we realized that the yard tracks we planned to add were really storage tracks for cars.

You can imagine the rest of the discussion. Railroads only make money when cars are moving. Track is a railroad's most expensive physical asset. Track has a 40-year life. So, why would we lay down track just to have cars sit idle? Aren't storage tracks really just treating the symptom, rather than the cause of the problem? Aren't we really throwing money (worst of all, capital dollars) at our operating problems, rather than brainpower? It wasn't pretty. But it was inspiring.

Poof! We lost the capital funding to add tracks, but were left with serious operating problems at the yard and the risk of a real nightmare as customers ramped up output.

Necessity is the mother of invention. We had no choice but to go back to basics. We began by analyzing every car that went through the yard, identifying root causes of our congestion.



VOICES

Bill Sheehan
Homewood,
Illinois



Gradually, we realized our salvation had to come from our customers. To make a long story short, we really started listening to our customers and becoming creative in solving their problems in order to solve our own.

We didn't succeed with every customer, of course, but we succeeded more often than we failed, and often enough that we did ultimately relieve congestion and free up sufficient yard capacity to meet growing demand for service. It would have been a whole lot easier, and faster, to lay track, but what we gained in really working with our customers is immeasurably more valuable.

In the process, customers begin to see us as partners, and sometimes even include us in the planning/design stages of their plant expansions, for more efficient layouts. The biggest payoff is when our customers work with us to develop unique ideas together. If we can lower their operating costs, while making ourselves more efficient, that's big! That's a win-win that pays dividends for years.



VOICES

Gary Petersen
Kamloops,
British Columbia

A profound respect for capital is fundamental to scheduled railroading. You really have to know your stuff to get capital projects approved. But isn't that how it should be? There's never enough capital to fund every project on our collective wish list. So before we ask for money, we have to ask ourselves, "Have we looked for an operating solution?" If we don't ask, someone else will.

One Thing Leads to Another

As often as not, tuning up a process in one part of an operation may result in an opportunity for improvement or savings somewhere else. Here's Gary Petersen, Mechanical Supervisor in Kamloops, BC, with a story about how by fine-tuning the sand delivery process in Kamloops, he saved CN a bundle in Saskatoon.

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It started as a pretty straightforward exercise in process improvement. Sand for locomotive traction was delivered by a dedicated railcar, which made only three trips a year. Between trips it just sat at the end of a dedicated track until it was empty, at which point it was switched out to make another run to Alberta for more sand. I knew there was a better way, because other yards, notably Thornton, had switched to truck delivery, with only a slight modification to the piping system.

It took us about an hour to make the necessary changes to switch to truck delivery as well. Since we no longer needed a dedicated railcar or a dedicated track, the car was sold for scrap and the Engineering department pulled up the track and the turnout, which could be re-used or sold for scrap. In addition to the revenue recovered by the sale of the car and the track, we realized savings by eliminating the switching move, as well as car and plant maintenance costs.

We could have stopped there, but we didn't.


Sand was transferred from the railcar to the sand tower with compressed air supplied by the 100-hp yard compressor, which had to be powerful enough to meet the needs of the yard as well as the sand delivery system. The truck, however, had its own compressor. So I asked myself if we still needed a 100-hp yard compressor.

The year before, we had worked with BC Hydro to reduce the power requirements of the yard lighting system. Under their Power Smart program, BC Hydro pretty much re-lamped a good part of the yard at their own expense. I contacted them to see if they were interested in exploring the possibility of replacing the 100-hp compressor with a smaller, more energy-efficient model. They were very interested, so we put together a quick business case, estimating how many kilowatt-hours we could save.

We must have presented a pretty good case, because they ended up covering the full cost of a new, \$39,000 energy-efficient 50-hp compressor that used only a third of the power of the 100-hp compressor. As a result, we reduced our electricity bill by more than \$30,000 per year.

We could have quit there, too, even further ahead of the game, but we didn't. I began calling around and letting people know that we had a perfectly good 100-hp compressor looking for a good home. Turned out that Saskatoon was looking for capital funding to replace three old compressors that were giving them trouble. So we loaded the 100-hp compressor on a Work Equipment truck heading in that direction, saving both the cost of transporting the compressor (the truck was going to Saskatoon anyway) and \$30,000 to \$50,000 of capital to purchase a new one.

None of these additional savings were planned. We just kept our focus on the assets and looked for ways they could be eliminated or used elsewhere. One thing led to another and it all started because I was tired of seeing that car sitting still day after day and knew there had to be a better way.



Key to running a scheduled railway is ensuring that each process is optimized.

Process Improvement

Some people seem to be able to look at an operation and see the opportunities and the problems that others don't see. How do they do it? They have a checklist, either in their heads or written down, that they run through whenever they look at a problem. It's a way of thinking. It works something like this:

1. Look at every process in every area. Ask if we can eliminate it.
2. Understand:
 - a. What each step in a process does.
 - b. How long it should take.
 - c. What we're paying for each segment/part/step.
 - d. How many people are needed to accomplish the number of cycles multiplied by the time per cycle.
3. Ask people why we do it that way. If they tell you, "That's the way we have always done it," you're on the right track; the process may not be understood and there may be room for improvement.
4. Now do two key things:
 - a. Measure the process and its outcome:
 - Be sure to use the right measures with data integrity (check where the numbers come from; wrong numbers will hurt you).
 - Test them. Do they really measure what you want to measure?
 - b. Give it real attention. Measuring a process is of no value if the improvements suggested by the results don't receive attentive support.
5. Now look at each sub-component and say:
 - a. We are going to do it cheaper, so let's figure out how.
 - b. We are going to do it faster, with fewer resources and/or better service, so let's figure out how.

This is as much attitude as it is intelligence. This is also where your measures really count. Does it take ten minutes to run that train down and switch it, or is it seven minutes and there has been fluff or break-time built in? Tap into your people's creativity – you may be surprised at what can be done.
6. Set new standards of expectations for each component you've looked at. Communicate them well and often, explain why they exist and hold people accountable for achieving them. Use recognition and explain consequences to reinforce the changes.
7. Share what you learn with your colleagues at your location and others. It's not bragging. It's making sure we don't reinvent the wheel.
8. Most important, **do it now and move quickly** – we can't afford to wait.

Asset Utilization

In general, we tend to think of assets as things we own. Locomotives, railcars, tracks, land, buildings, tools, and software are obvious assets. Capital is also an asset, as are employees and the skills they bring to the job.

An asset isn't an asset, however, until it's put to use. Until then, it's a liability. Assets have to earn their keep. An expensive asset that isn't being used to its utmost potential is just an expensive liability.

And assets aren't free. Ownership has its costs, and when you have 2,100 locomotives and 121,000 rail cars, those costs add up fast. If even a fraction of our rolling stock sits idle on any given day, it's not generating any revenue, but we're still paying for it. Therefore, we need to take a long hard look at what we have on hand and what we really require to run the business.

Guiding Principle #3
Asset Utilization

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Asset utilization is maximized through continually fine-tuning processes.



Cost control and asset utilization are closely linked. Both are improved by fine-tuning key processes.

Every process requires assets. When a process, for example, the car cycle, is inefficient or uncertain, assets go to waste: cars, track, and the capital required to buy or lease the cars and build the track. And if the car cycle process is inefficient, we need more cars to meet our customers' needs, resulting in more waste.

The more efficient any process, the fewer assets it requires. An efficient car cycle requires fewer cars because the cars in the cycle sit less, are used more. Efficiency also makes processes less uncertain. The less uncertain a process, the less capital you have to hold in reserve. Bottom line, if we make processes more efficient, we eliminate unused and wasted assets from the system.

And just because you don't work in Operations, don't think that you don't have assets (or processes). File cabinets, floor space, computers, office equipment are all assets, and expensive ones. It's as important to maximize the utilization of these assets as it is locomotives or railcars. For example, at one time there were an estimated 275,000 boxes of records in storage. That takes up a lot of space that costs money and could be put to better use. So the next time you send a file to storage, ask yourself, "Are we *really* going to need it?" If you send it to storage "just in case," you are using assets poorly.

Focusing on asset utilization keeps attention and pressure where it belongs: on the process. Any asset that is underutilized is a logical starting point for process improvement. By asking why it is underutilized and how that can be improved, we can more finely tune the process.

Asset Utilization – The Basics

Take any asset and every process that uses it. Is that asset necessary to the process? Can that process be refined to use fewer assets? For every process, the more finely tuned it is, the greater its precision and the fewer assets it uses.

Here are some tips on how to get a better handle on your assets:

- Identify assets under your control.
- Challenge conventional wisdom around those assets. Ask yourself: Can I manage with less? Do I need as much as last year? Do I need any at all?

Don't just sit on your assets. Do something.

- Minimize every physical inventory.
- Be creative with your assets. Ask yourself, are they underutilized? Could they be better used elsewhere?

Stories from the Field

A Relentless Pursuit

We need just the right amount of assets to get the job done. Too many, and we end up caught between a rock and a hard place, where the surplus assets inflate our operating expense, and clog the system. Here's Shauntelle Paul of Edmonton, Alberta, with a brief anecdote of how her team scored a two-base hit on an asset reduction scenario.



It takes courage to try something different, but that's what our culture is all about. Don't follow, but lead the pack. We are fearless in our approach to trying new things.

CN's success rests on our relentless pursuit of flawless execution. In doing this, we strengthen our partnerships with customers, and spend more time discussing new opportunities rather than fixing problems.

Last fall, our Intermodal Asset Team, with support from Terminals and Marketing, took 1,200 platforms out of the fleet, resulting in \$25,000 a day in car hire savings. What's incredible is that we accomplished this right in the midst of our peak business, and at a time when a lot of volume from the U.S. was being diverted to the Vancouver port. I'm extremely proud of our team's accomplishments!

Moreover, it's amazing how one success becomes the catalyst for the way we do business in other areas. With fewer cars available to load in our terminals, we did a better job of loading each platform available on each car. Furthermore, fewer cars lead to improved fleet velocity, reducing the idle time of cars in a terminal. The railroad is like a spider's web – you touch any part and it creates a ripple effect.

VOICES

Shauntelle Paul
Edmonton,
Alberta



Lateral Thinking

Here, Tom Goodwine of Homewood, Illinois, recalls a brief dialogue that shed fresh light on another asset reduction challenge.



VOICES

Tom Goodwine
Homewood,
Illinois

This is 1988 and our new COO suggests cutting the locomotive fleet almost in half! We're talking hundreds of units! He says, "How do you think we should start?"

We say, with all due respect, "We're using them all now."

"How many at Memphis?"

"Twenty-four."

"How many jobs?"

"Twenty-one. Twelve on days, five on afternoons, four on nights."

"So, if you could do seven jobs per shift, you'd only need 14 engines?"

"But customers might object to being switched at night."

"Have you asked 'em?"



Safety

Safety is every employee's responsibility. Accidents and injuries take a huge toll in physical pain and emotional suffering. Even minor accidents and injuries are a drag on the organization: morale, paperwork, time, energy, and beating ourselves up with hindsight.

That's why, no matter how you look at it, safety is good business. Sure, it takes discipline and diligence – 100% compliance with safety and operating rules 100% of the time – but the payoff is enormous.

The financial cost of the average derailment – the cost of damaged track and rolling stock, repair crews on the scene, customer penalties, environmental damage and clean-up, traffic diversions, paperwork, and so on – can be huge, often running into the millions of dollars. The psychological and emotional costs to employees, their families, colleagues, and friends can be immeasurable. What wouldn't we do to avoid that?

The more predictable any operation or process, the safer it is. When a process is unpredictable, or haphazard at best, we become prey to uncertainty about what will happen and when. This opens the door to distractions, snap judgments, shortcuts, possibly even risk-taking. It's a sure route to disaster, and the last place we want any of our employees to go.

When a process is predictable, the exceptions are fewer, and any safety issue associated with an exception is more readily apparent. In short, there are fewer unexpected factors to juggle and fewer distractions, freeing up brainpower to be on safety alert. Knowing with certainty what's required each day, we can better anticipate the day's events, and be prepared in advance, for example, by ensuring that the tools and equipment we'll need are where they're supposed to be and in good working order.

Safety – The Basics

Many aspects of railroading are inherently risky. Heavy, powerful equipment moving at speed is dangerous. You have to be on your toes at all times. Unhappily, for far too long, safety was seen as an

Guiding Principle #4 **Safety**

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Safety means 100%
compliance 100% of
the time.

impediment to doing business. That attitude has changed. Safety is good business. Here are a few things you can do to ensure safety in your operation:

- Always, everywhere, and forever, strictly adhere to the Operating Rules, for your safety and the safety of everyone around you.
- Repeatedly confirm your personal 100% commitment to safety as the first priority. Demonstrate it every day through your personal actions. Never compromise – on safety or your own integrity.
- Never let anyone else compromise their safe work practices. Ignoring it is not doing them a favor – acting on it could save their lives.
- Strive for greater predictability in the processes under your control.
- Focus on prevention with regular safety audits. Keep a keen eye on housekeeping: tools left on the floor, wires underfoot, file drawers left open, and so on.
- Analyze every near miss, as well as all reportable and non-reportable injuries. Any accident can be attributed to one of three things: the environment (tools, equipment, facilities), people (training, knowledge, skills), or unsafe behavior.

Stories from the Field Zero Tolerance

Sometimes we tend to think of safety as a set of abstract guidelines for those of us that need them. Here's E. Hunter Harrison with a story about how he learned the hard way that safety isn't an abstract concept at all, that failing to commit fully to safety has very real – and sometimes tragic – consequences.

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Everyone at CN knows I have zero tolerance for unsafe work practices. I insist that each and every one of us follow the rules with 100% compliance 100% of the time. I know there are a lot of different opinions about this policy, but it's important that you understand where I'm coming from. There are simply too many



VOICES

E. Hunter Harrison
Montreal, Quebec

accidents in this industry, too much pain and suffering that could be avoided if we'd just follow the rules. I know this first hand, but I had to learn it the hard way.

When I was a trainmaster on another railway, the shortest route from the yard office to the employee parking lot was a quick hop across a live track. There was a slightly longer route around the building, but a lot of people took the shortcut, even though the safer – and required route – was the longer one.

I was in my office one Friday afternoon when a loud alarm and flashing blue light signaled that we'd just had a potentially fatal accident in the yard. I ran outside to find one of my co-workers, lying on the tracks and covered in blood. He wasn't dead, but he was very seriously injured. His leg had been severed and was lying on the track beside him.

How had this terrible accident happened?

It happened because he'd ignored the rules and cut across the tracks on his way to the parking lot. Maybe his mind had been on the coming weekend, or maybe he'd just been tired. Whatever the reason, he hadn't noticed the cut of cars rolling silently toward the retarders – pushed from some distance away – that knocked him down, took his leg, and almost took his life.

The saddest thing about this accident is that it could so easily have been prevented. If he'd obeyed the rules and taken the longer route to the parking lot, he wouldn't have been in the wrong place at the wrong time. I've seen too many people, at CN and elsewhere, make those little compromises that too often lead to such tragic results. That's why I'll never back down on this issue. We owe it to our employees, their families, and the company. Zero tolerance may seem extreme, but bitter experience tells me that 100% compliance to safety 100% of the time is as critical to good railroading as any of the other guiding principles.

I've said many times that the rules are written in blood, the blood of those railroaders who let their guards down, didn't follow the rules, and paid a terrible price. But if I have anything to say in the matter, it won't happen on my watch.

Let's take care of each other.

A Passion for Safety

When was the last time you heard someone complain that his or her workplace was just too darn safe? Here's Kevin Guiney, HR Manager in Winnipeg, Manitoba, with a story about how a new boss brought a passion for safety to Transcona Shops.



VOICES

Kevin Guiney
Winnipeg,
Manitoba

When Terry Corson came to Transcona as Director of Mechanical, his personal mission was to make Transcona Shops the safest facility, not only in CN, but in all of North America. For Terry, success means getting the job done safely through people. The perception that we need to get things done at all costs is dead wrong. Safety is integrated into everything we do and is never compromised.



The first thing Terry did was to explain his vision of safety to his team – to instill a sense of urgency on making breakthrough improvements. He insisted that all supervisors determine the root cause of every single injury (no matter how minor) through a comprehensive investigation. Once the root cause was identified, an action plan was put into place to prevent future recurrences.

The second thing Terry did was to remind employees that these behaviors are not acceptable, and he mandated all employees to follow strict safety procedures, such as wearing personal protective equipment at all times.

How serious is Terry about safety? In one of the shops there had been five minor injuries in a period of 48 hours. Terry immediately called for a shutdown. Imagine a shutdown for 15 minutes with 600 people – that's big! Then his managers met with the employees to discuss the causes of these injuries. This shutdown also sent an important message to employees: When we say safety takes precedence over production, we mean it!

Through Terry's passion for safety and the commitment of the people there, Transcona Shops achieved a breakthrough improvement of over 30% in their personal injury ratio compared to the same period the previous year. Fewer employees were getting hurt. A win-win for everyone! Terry's reward was to see front line supervisors taking on a leadership role, where they saw the fruits of their labor in a short period of time. We credit the great work of the supervisors and employees at Transcona Shops!

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People

"You don't succeed for very long by kicking people around. You've got to know how to talk to them, plain and simple."

Lee Iacocca, *Chairman, Chrysler Corp.*

Last, but not least, is the People principle. Everything we've talked about so far – Service, Cost Control, Asset Utilization, and Safety – is built on the foundation of People. Without people, none of it happens.

People drive the trains that transport our customers' goods. People maintain the tracks on which those trains run. People answer the phones when a customer calls. And people design, refine, and execute the plans, processes, and procedures that make the incredibly complex machinery of a modern railroad work.

But there's more to it than just pushing someone into a locomotive or setting them down at a customer service desk and saying, "Go to it." A lot more. We have to recruit the right people. We have to develop them on the job, clearly defining what's expected of them. And we have to keep them.

"If you pick the right people and give them the opportunity to spread their wings and put compensation as a carrier behind it you almost don't have to manage them."

Jack Welch, *former Chairman and CEO, General Electric*

To achieve their full potential, to do the "right thing," people need a nurturing environment. They need to be kept in the loop, made aware of the day-to-day objectives, as well as the "Big Picture." They need to be given the right tools and training to do their jobs properly. And they need to be rewarded for doing the right thing, which encourages them to continue doing it.

This cycle is often called the ABCs of performance management. ABC is an abbreviation of Antecedent-Behavior-Consequence. Basically, ABC is a method of analyzing the causes and effects of behavior; in other words, why people do things the way they do. When you understand why people behave a certain way, you can more easily change their behavior.

Guiding Principle #5

People

CN is powered by
passionate people.

ABC

Antecedent: Something that comes before a behavior that sets the stage for the behavior to occur.

Behavior: What a person does.

Consequence: What happens as a result.

In very simple terms, ABC works like this: You see a stop sign (antecedent). You stop the car (behavior). You avoid collisions (consequence). In a business/operating environment, though, it's a little more complicated, but what it boils down to is that given the right motivation, tools, and training, most people will do the right thing because doing the right thing reaps the greatest rewards.

Generally speaking, antecedents have a relatively small (20%) influence on behavior, while consequences have a much greater (80%) influence. Of course, antecedents and consequences must match in order to promote the correct behavior. If they don't, if the "talk" doesn't match the "walk," employees lose faith in their leaders.

Consequences come in different flavors too. They can be positive or negative; they can be immediate or deferred; or they can be certain or uncertain – Will you actually experience the consequence? Naturally, if you know that the consequences will be positive and immediate, you're more likely to do the right thing; that is, the thing that elicits those consequences.

Positive or Negative Reinforcement

While both change behavior, positive reinforcement gets you that extra effort; negative reinforcement gets you just enough to get by.

But what is the "right thing"? For years, the "right thing" was what was good for that particular little piece of the operation for which an individual, or a small group of individuals, was responsible. They behaved that way because they were rewarded for doing so.

Today, however, the "right thing" is what's good for the railroad as a whole. But how do we get people to stop doing what's right for "me" and do what's right for "us"? It's as simple as ABC: we make

Grandma's Law of Consequences

"If you eat all your vegetables, you can have dessert."

sure they understand what's expected of them, make sure they have the tools to do the job, and we make sure that when they do it, they're appropriately rewarded.

In other words, we exercise leadership – more specifically, we exercise *effective* leadership.

Leadership - The Basics

The term “leader” applies to everyone in any organization. A leader is anyone who has influence over others to direct their efforts toward the attainment of specific objectives. While leadership isn't something that can be learned from a book, the basic qualities of a good leader are pretty straightforward. Depending on how deep you drill, the list can be quite long, but in terms of performance management, the three most important elements are these:

- Good leaders maintain clear lines of communication with their employees, making sure they know what needs to be done, and that everyone is on the same page.
- Good leaders lead by example – they “walk the talk.” A “do as I say, not as I do” attitude isn't good leadership. You get more out of your employees through inspiration than through intimidation.
- Good leaders deliver on their promises, make sure that antecedents and consequences match, and that the consequences of doing the right thing are applied just as vigorously as those for doing the wrong thing.

In other words, good leaders act with integrity. They do the right things and they make sure employees know what's expected of them, immediately rewarding them when they do the right things, but quickly taking corrective action to get them back on track when they do the wrong things.

“I have found that being honest is the best technique I can use. Right up front, tell people what you're trying to accomplish and what you're willing to sacrifice to accomplish it.”

Lee Iacocca, *Chairman, Chrysler Corp.*

One of the most fruitful areas of application of these leadership principles is in our relationship with our unionized workforce. Our employees will give their maximum effort if they are assured their contribution to our productivity will enhance their wages and/or job security. For example, by negotiating the removal of work rules that aren't customer service oriented, we can increase our service offerings and reliability – a win/win for our employees and our customers.

Good leaders...

- Walk the talk.
- Also know how to follow.
- Know what needs to be done and communicate it effectively.
- Have passion and inspire it in others.
- Have a high degree of personal integrity and insist on it in others.
- Know their people.
- Continuously provide feedback and deliver consequences, both positive and negative.
- Deal with conflict and performance issues in an immediate, straightforward, and toe-to-toe manner.
- Make the tough calls.
- Listen to – and hear – their people.
- Champion their people.
- Get results.

"If you don't get the People principle right, don't bother trying with the other four."

E. Hunter Harrison,
President and CEO,
CN

Stories from the Field

People Make It Happen, If We Let Them

Sometimes we have to deal with situations for which there are no guidelines other than common sense. Then we have to ask ourselves, are we going to violate any safety or operating rules, renege on any customer commitments, or do something financially unsound? If it makes sense, do it. Here's Tom Goodwine again, wrestling with his conscience, trying to decide which was more important, the customer or a couple of fancy locomotives.

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VOICES

Tom Goodwine
Homewood,
Illinois

I really thought I was going to get fired over this one. We had an empty coal train in Chicago that had to get to Captain Mine south of Centralia. The mine was really hurting for this unplanned train. We had no power in Chicago, and none close enough to make it in time for the customer. I called Jimmy Danielwicz.

"How long would it take to fire up the E9s?"

"Why..? Are you nuts..? Okay, give me two hours."

You gotta understand, the E9s were the pride of the fleet, for the office cars. Pretty as could be. Fresh paint, not a mark on 'em. So, we run this coal train down to Centralia; customer's delighted. Plus, there were 100 empty hoppers down there waiting on power. So, we have the E9s head back to Chicago via Iowa. We pulled it off! I'm just starting to relax, not knowing Hunter's talking to Jimmy, when I get the call:

"How's everything going?"

"Fine."

"Running any coal?"

"Yessir."

"Where are the E9s?"

"The E9s?"

"Goodwine, when you answer a question with a question, you're thinking of lying to me."

"Lying?"

I took a lot of razzing, but I had done the right thing, and he supported my decision. You've got to support your people and respect their decisions. If you want people to take initiative, and

trust their own judgment enough to take action, you can't second-guess them. The guy in the trenches is charged with making decisions, and you hold him accountable. But you don't browbeat him. If it turns out to have been a bad decision, well, you talk about it, learn from it.



All in a Day's Work

Sometimes an action that appears heroic from the sidelines is just all in a day's work from the point of view of the participants. Time and again, people step up and do what needs to be done and then are surprised when they are hailed as heroes. Here's engineer James Reed, of Jackson, Mississippi, with a story about a day's work that earned him, conductor Sam Cook, also of Jackson, and dispatcher Paul Kirk, of Homewood, Illinois, a special President's Award for action above and beyond the call of duty.

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On November 26, the Friday after our Thanksgiving, Sam and I were northbound, coming into McComb Yard in Mississippi with a 100 car intermodal train. We had just cleared the hot box and dragging equipment detector at the Chatawa crossing, travelling about 60 mph, when dispatcher Paul Kirk radioed and told us to bring our train to a stop. I did, then radioed back that we were stopped. That's when he informed us that we had a runaway train coming by Fernwood Junction, about five miles away and heading in our direction at about 35 mph. Thirty-two cars and two locomotives – and no crew.

Paul was very calm and matter-of-fact about it, like this was something that happened every day. It wasn't, of course. But his composure helped us stay calm and in a few minutes we had a plan. Instead of abandoning our train, we would back up and "catch" the runaway.

When we operated with larger crews we used to drop cars off one end of a consist, let them run by, then catch up and couple to them while they were still moving. Someone always rode the brakes of the cars to make sure they didn't get away if the couplers didn't mate when you bumped. Coupling to the runaway wouldn't be all that different, just with more cars and at a higher speed. And no one riding the brake, of course...

From where our train was stopped we couldn't see the approaching train because of the curve, so Sam got his radio belt, detrained, and headed in the direction of the runaway. If the runaway had slowed enough he would board it and bring it to a stop

himself, but when it caught up to him he knew it was still running too fast for him to safely board.

"You better start backing up," he radioed back to me. "It's coming at you at a pretty good clip." He told me that Paul Kirk had lined the switches and signals at the Osyka siding, four or five miles to the rear, for the main track.

I began to back up. I had almost a mile of train behind me and there were a couple of farm crossings back there. If I hit anything I would surely derail. Then I'd be between the hard place and the rock for sure. But I was confident I could catch the runaway.

To make a long story short, I more or less matched speed with the runaway and let it catch up to me. The runaway was going about 30 mph – my train about 3 mph slower – when the couplers contacted. When I heard the pin drop, I accelerated a little so that the couplers wouldn't bounce apart. I then applied the brakes and brought both trains to a halt in under a quarter of a mile. It was one of the smoothest couplings of my career, if I do say so. I had a cup of coffee on the control stand and didn't spill a drop.

No one would have blamed us if we'd left the train, but from where Sam and I sat, leaving the train was not an option. Not only would a collision have destroyed the locomotives and torn up the track, there was no guarantee that if we did abandon the train we wouldn't get caught up in the derailment. The choice we made wasn't bravado, it was common sense. It isn't something we want to ever have to do again, but it was pretty much all in a day's work.

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Part 2

We Are All Precision Railroaders

Introduction

The five guiding principles of Service, Cost Control, Asset Utilization, Safety and People define how we work. In this part we'll take a look at why we do what we do. In other words, who we are, what drives us, and how each of us can use the five guiding principles to help us do our jobs better. Whether we work in Sales and Marketing, Operations, Finance, the People department, the Law department, or Public Affairs, we all have an important role to play in CN's success as a business, and as a corporate citizen.

The Guiding Principles Apply to Us All

It's tempting, and perhaps too easy, to fall into the trap of thinking that just because you don't run the trains you aren't a railroader and, therefore, the five guiding principles don't apply to you. Nothing could be farther from the truth, and we can prove it.



A syllogism is a logical argument made up of two statements and a conclusion. For example: "All trees have roots, oaks are trees; therefore, oaks have roots." Here's another one: "CN is a precision railroad, you work for CN; therefore, you are a precision railroader."

The five guiding principles apply to everyone in the company, not just the people who run the trains or work in the executive offices. We can write a syllogism for this, too: "The five guiding

principles apply to all railroaders, you are a railroader; therefore, the five guiding principles apply to you." Perhaps it's stretching the point, but you get the idea.

Although we all contribute to CN's successes, by applying the five guiding principles to our jobs we can do our jobs better and, therefore, contribute more. However, it may not always be that easy to see how each of the principles apply to our jobs. It's not that hard, either. It just requires looking at your job in terms of its part in a much larger whole.

Stories from the Field

The Salesman and the Superconductor

All CN employees are railroaders, but are all railroaders salespeople? Here's Mike Cater, from Western Canada Regional Sales in Surrey, BC, to tell us about how Jim Halberg, a conductor from Kamloops, BC, and he teamed up to land a new client for CN.

In the fall of 2001, I got a call from Jim Halberg. He introduced himself, then said, "I was told you might be able to help me."

"I'll do my best," I said.

He told me about a friend of his who was the general manager of a propane distribution company, Canwest Propane, that was served exclusively by truck from Edmonton, Alberta.

"I know it," I said. The Canwest Propane distribution centre was right next to Thornton Yard in Surrey.

"He's interested in talking to you," Jim said.

"About what?" I asked.

"About giving us the business," he said.

For a second I thought that maybe he was giving me the business. Canwest was a successful company with a long-standing relationship with their transportation supplier. It was hard to imagine them switching from truck to rail right out of the blue. Nevertheless, when Jim asked me if I was interested in meeting with his friend, I said, "Darn right."

"Okay," he said. "I'll set it up."

Which is precisely what he did. He arranged the meeting, then,

VOICES

Mike Cater
Surrey,
British Columbia



on one of his runs to Thornton Yard, took some time during his layover to personally introduce me to his friend. He'd already started the ball rolling, I discovered. Canwest was interested in growing its business and Jim's friend had expressed some concern about the transportation situation. Jim had suggested that perhaps he should consider rail as an alternative to trucking. Because Canwest was literally just across the road from Thornton Yard, it seemed like a good fit, so his friend agreed to let Jim set up a meeting. Jim asked around and someone pointed him in my direction.

He did this all on his own time, of course. And, believe me, if Jim didn't think making the switch to rail was a good thing for Canwest, he wouldn't have suggested it in the first place. He's that kind of guy.

So now the ball was in my court. I started working with Canwest to see what we could do for them. We could do a lot, as it turned out. The quality of our service almost sold itself, but there were a number of logistical issues that had to be ironed out. Although Canwest was close to Thornton Yard, it wasn't quite close enough. However, with the substantial savings they would realize by switching to rail, they were able to acquire some land adjacent to the yard and build a new rail facility.

It was rough going at times, but Jim kept in touch throughout the whole process, reassuring me that his friend was happy with the way things were developing. Finally, in September of 2004, Canwest's first propane shipment arrived by rail at its brand new facility.

Canwest has committed to giving us all their inbound traffic for five years, which represents a substantial amount of new business for CN, business we wouldn't otherwise have if it weren't for Jim Halberg thinking outside of the box. I'm just glad I was able to do my part.

We All Contribute

CN exists to serve its customers (although, as we'll see later, there's a lot more to CN than simply the delivery of our customers' goods). As we pointed out in the Service principle of Part 1, if you aren't

serving the customer, you are serving someone who does – or serving someone serving someone else who does. Think of CN as a pyramid with the customer at the top.

CN consists of three major functions: Operations, which is by far the largest; Sales and Marketing; and four support departments.

- ▶ People
- ▶ Finance
- ▶ Information Technology
- ▶ Law, Public & Government Affairs and Risk Management

Each of these support departments exist to serve Operations and Sales and Marketing. If you doubt the importance of the services they provide, ask yourself if Operations or Sales and Marketing could function without them. Obviously, they could not. And if they can't function, CN wouldn't exist. Briefly, here are some of the ways the five guiding principles apply to these departments.

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People

People are the base on which the other four principles are built and the People department is responsible for making sure CN's people are the best they can be. The People department provides a *service* to CN's other divisions, working with managers to recruit qualified people to do the jobs, setting the right compensation levels to attract and retain them, developing and delivering training, counseling managers on people issues, negotiating collective agreements, and managing benefits and pensions. By finely tuning these *processes*, the People department controls costs and maximizes the use of expensive assets. And at all times, the People department is committed 100% to *safety*. For example, every training session begins with a job briefing that identifies potential hazards and emergency procedures, locates exits, and assigns first aid responsibilities.

Finance

The Finance department applies the Service principle when it works with Customer Service to collect revenues from our customers. It applies the People principle as it continuously works to improve employees' skills to ensure a pool of qualified candidates for future

critical positions. The Finance department applies the principles of Cost Control and Asset Utilization to the management of CN's capital expenditure budget to ensure we are getting the best return on our investment. It rationalizes CN's real estate assets (buildings, office space, etc.), disposing of surplus property and equipment. And it continuously examines each of its own processes to make sure they are working the way they are supposed to work.

Information Technology (IT)

We live in the Age of Information. We could no more move our customers' goods without information than we could without diesel fuel. Someday we'll no longer need diesel fuel, but we'll always need information if we're to know what we're supposed to deliver when and where. And it's information that allows us to manage our vast fleet of cars and locomotives, dispatch and route trains, manage payrolls, benefit plans and accounts receivable. IT serves all the other departments in CN by ensuring that the information they need to do their jobs is accurate and available when they need it, and that the tools and technology they need to use that information are appropriate and reliable. By diligently controlling costs, IT decreased its operating budget by Cdn\$20 million in four years. Moreover, information, and the skill to use it, is a major asset, not only to CN, but to other industries; therefore, IT maximizes asset utilization by using our internal consulting team (Business Transformation Team) to leverage our information and technology base to create breakthrough value in the business.

Law, Public & Government Affairs and Risk Management

The Law, Public and Government Affairs and Risk Management group has the responsibility to protect and promote CN's people, business and reputation.

If locomotives and track are among our most expensive assets, our reputation is likely our most valuable. Managing the issues that CN faces every day depends on well-established relationships and trust. Law, Public and Government Affairs and Risk Management manages CN's reputation, dealing with a wide variety of organizations and individuals, such as the media, community groups, regulators, and governments at all levels.

Risk Management, which includes CN Police, protects our people and our assets. Our Law group defends CN's interests and business, while Public and Government Affairs works on the relationships we need in communities, with governments and industry organizations, to ensure our views and interests are heard and understood – always, not just when there is an issue.

If someone damages our crossings, trains or any part of our business, we pursue compensation. If someone unfairly challenges our reputation, we defend it.

We work to ensure that the regulatory environment for railways is fair and balanced in comparison with our transportation competitors. We also monitor and input on any other regulatory issue that is of concern to CN's business interests.

With our customers' requirements for shipping goods across borders constantly growing, and post-September-11 security concerns, managing CN's relationship with customs and police agencies throughout North America is crucial to eliminating disruptive delays in our traffic. This is just one example of how our reputation has a direct impact on service.

Where We Go From Here

No matter where you work in CN, your job is to provide the best service you can to your customers, be they CN's customers or internal clients. You do this by controlling your costs, by maximizing the utilization of the resources your processes use, by committing 100% to safety, and by providing good leadership.

This is *how* we work. In the following section, we'll take a look at why we do what we do. You might think that the answer to that is obvious, that we do it to make money. And you'd be right. But if you think that making money is the *only* reason we do what we do, you might be in for a surprise.

Why We Work

The year 2004 was CN's most successful in its history. From a financial and operating perspective, we exceeded our own expectations, as well as those of the market. Earnings per share, revenue,

operating ratio, and free cash flow are the yardsticks we use to measure our success, and they mean a lot to the market. But there's more to it than that.

To our employees, our success means we will continue to grow, thus being able to provide wage increases, benefits, and a stable pension plan, as well as opportunities for advancement through training and professional development.

To our customers, our success means we're providing the service they need. Because we do what we say we'll do and meet our commitments, our customers can continue to succeed. They are in business, just like us. Their success is good for their employees, their shareholders, customers, and communities. The effects of our success ripple outwards.

Our success also means that our shareholders are earning a return on their investment, that their money is growing. And our shareholders aren't just other companies or financial institutions. They are also individuals who have entrusted us with their money. A good number of them, too, are our co-workers. Forty-five percent of CN employees own shares in CN. That's significantly higher than in many other companies, and it's still growing.

And our success as a business also means that we can be a better corporate citizen and give back to the community in which we work and live.

CN as Corporate Citizen

CN makes a major economic, social, and cultural contribution in many communities. CN itself provides employment to members of the community, and by attracting industry that requires rail transportation, creates more employment. CN and its employees, as well as the employees of the businesses attracted by CN, spend money in the community, and pay taxes. Rail, unlike other transportation industries, pays for its own infrastructure; CN pays taxes, but taxes do not pay for CN.

CN's social contribution to the community includes crossing safety and trespassing programs in local schools. The company and its employees have also provided assistance during natural disasters, such as the Winnipeg flood or the January 1998 ice storm that

shut down a good part of eastern Canada and the northeastern United States (see *Stories from the Field: The Ice Storm*).

Rail transport also relieves highway and cross-border congestion and makes better use of land.

CN funds numerous educational scholarships: sixty-seven for the children of employees, forty-eight for women in non-traditional trades, seven for disabled persons, four for Native Peoples, and twelve safety-related scholarships. It sponsors university programs, building funds, community events, and numerous community safety programs.

On the environmental front, rail is one of the most energy-efficient methods of moving freight. Three times more fuel-efficient than trucking, it produces far less pollution for every ton of freight moved. Moreover, thanks to newer, more fuel-efficient locomotives, and the more efficient use of them, CN has significantly reduced locomotive emissions during a decade that saw traffic increase by more than 25%.

As part of its environmental awareness, CN recycles, reuses, or safely disposes of waste materials. Where CN lines cross migration routes, we construct wildlife corridors. In the event of a hazardous materials incident, the Emergency Response Program handles all aspects of the incident, through public information, on-site control, clean-up, and environmental protection.

Finally, CN has always taken pride in being a leader in good governance. In 2003, we adopted a formal Code of Business Conduct for all employees to set clear and consistent standards.

Just as an individual has a responsibility to his or her family, community, and employer, so CN has a responsibility to its employees, customers, shareholders, and the community in which it does business. There's no denying that CN is in business to make money so we can continue to grow, continue to get better at what we do, continue to reward our employees for a job well done, and continue to give our shareholders a return on their investment. However, CN will also continue to be a good corporate citizen because it is part of our commitment to supporting the community.

Stories from the Field

The Ice Storm

In January 1998, up to four inches (100 millimeters) of freezing rain fell on eastern Canada and the northeastern United States in five days. Steel hydro towers collapsed under the weight of the ice. Falling trees took out hydro poles and hydro lines and blocked streets. Millions of people were without power for days, even weeks. Here's Michael Farkouh from Taschereau Yard with a story about how CN came to the rescue of the town of Boucherville, a suburb of Montreal on the south shore of the St. Lawrence River.

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VOICES

Michael Farkouh
Montreal,
Quebec

About a week into the storm we got a call from Public Affairs. Francine Gadbois, the mayor of Boucherville, had called to ask if CN could hook up a locomotive to supply power for City Hall, where they had set up their emergency command center. While power had been restored to parts of Montreal Island, it was still out on the South Shore and things were getting desperate. Mayor Gadbois recalled once seeing a locomotive used as an emergency generator and wondered if CN could provide one to supply power for their emergency command center.

At first it seemed like a crazy idea, born of desperation, but the more we thought about it, the less crazy it seemed. There was a level crossing on De Montarville Boulevard, Boucherville's main drag, but it was at least 1,500 feet from City Hall. We could get the locomotive to the crossing, but then what? We couldn't leave it there, blocking the main line. We weren't back up to full operation yet, which was why we could spare a locomotive in the first place, but there were still some trains running. Nor could we simply derail it and park it next to the track; we couldn't run power lines that far along a busy street.

"Okay, then," someone said, "we lift it onto a float with a 130 ton mobile crane and move it to City Hall." Only problem was, we couldn't find a float big enough; they were all being used.

"What if we just turned it ninety degrees to the crossing and drove it to City Hall?" someone else asked.

As crazy as it sounds, that's exactly what we did. We hoisted the locomotive off the track and set it down perpendicular to the

crossing. Then we drove it about a hundred feet, very slowly, just to see how things went. The wheel flanges sank into the asphalt, of course, but not too far, and it stayed on course. So we throttled up to about walking speed and drove the rest of the way. Typical Quebec drivers, we blew right through a stop sign.

We ran into one small problem once the locomotive was parked in front of City Hall. Locomotives operate at a variable frequency, whereas commercial power is a constant 60 cycles. It took us about an hour to find an engine speed that would work. Then Hydro-Québec hooked the locomotive up to City Hall and the lights went on.

The locomotive was there for about a week. It was a pretty strange sight. And the scars the wheels made in the road were still there a couple of years later, a reminder of the ice storm and the spirit of community that got us through it.



Part 3

How a Railroad Works

The Evolution of Railroading

Introduction

In some respects, railroading hasn't changed much in a century and a half. In many places it's still a basically "linear" operation, trains running back and forth between terminals along a single ribbon of track, scheduled to meet at sidings or on stretches of double track – steel wheels on steel rails.

In other respects, however, railroading has changed a lot, physically, technologically, operationally, economically, politically, and culturally. Class 1 railroads have evolved into incredibly complex, continent-spanning international (and intermodal) transportation networks. Simultaneously, short-line railroads have emerged to handle the relatively small local and regional operations to feed the Class 1s.

Steam has been replaced by diesel-electric, electric, and, in some cases, gas turbine engines. Microwave, fiber optics, and satellite communications have replaced the telegraph. As a result of deregulation, competition from trucks and other railroads, and changes in the marketplace, the old territorial imperatives have evolved into a new global perspective.

Some of the most radical changes, though, are not quite so apparent. They involve *how* we run the railroad and *how* we do business – or, as the title of this book says, *How We Work and Why*.

The "Traditional" Railroad

From the time that railroads were built to open the West and link the coasts, until mid-20th Century, things were pretty good for the railroads. Their biggest operational constraints were geographic and climatic, and in many cases, customers were captive because the railroad was the only game in town. You either played by their rules or you didn't play at all. Pricing of freight services was more a matter of extorting a cut of the customer's revenue than a negotiation of equals.

Around the middle of the 20th Century, things began to change. The post-war era saw a tremendous surge in highway construction. Suddenly, the Trans-Canada Highway and the American interstate highway system made it possible for trucking companies to access

customers anywhere on the continent and compete directly with the railroad for carload-size shipments.

Although competition from truckers was hardly welcomed, the railroads managed to hold onto the lion's share of the transportation market. This was especially true for bulk commodities, which truckers could not handle. And because of their territorial rights, the railroads didn't have to worry about competition from other railroads.

Given this situation of low competition and high profitability, the railroads enjoyed the best of all worlds. Service was something the railroad provided more or less on its own terms. Cost control and asset utilization were minor issues; costs were simply passed along to the customers.

The "Scheduled" Railroad

For the sake of customers, employees, and logistics, railroads have always run on schedules. However, by the 1960s, after losing so much of their carload business to trucks, the railroads began to focus on trainload as the most cost-effective way to operate trains, running as few as possible as full as possible. While this was good for the railroad, it wasn't good for the customer. High interest rates made holding large inventories prohibitively expensive for manufacturers and suppliers. They adopted a "just in time" inventory strategy to minimize costs. Unfortunately, because the focus was on trainload, the railroads did not respond with a schedule that provided reliable enough service. By the 1980s those shippers that weren't captive (due to location or because they were bulk shippers) had all but abandoned the railroad for trucks. Deregulation, which made it even easier for trucks to compete, as well as opening up competition between railroads, made matters even worse.

In an effort to recapture customers from trucks (or keep the customers it had), the railroads dusted off the old idea of a scheduled and customer-driven railroad, applying it first to intermodal operations, which competed most directly with trucking, then to carload or "loose-car" operations.

The problem, however, was that the underlying organization and "culture" of the railroad hadn't changed to keep pace with the

operational focus. Regional managers were still being rewarded for optimizing their local operations, regardless of how it affected bordering regions. Get the train out on time, no matter what. Not enough cars in the pipeline to supply the customer? Buy or lease more. Not enough storage track to hold all those cars? Build more. The prevailing attitude was that you could either provide good service or you could run a profitable railroad, but you couldn't do both.

The "Precision" Railroad

In the mid-90s, a new breed of railroad began to emerge in North America. CN went public in 1995, and within a few years had transformed itself into a lean and profitable enterprise. The operating ratio – the ratio of operating expenses to revenues – dropped from the high 90s to the high 60s, a reduction of 30%. CN had become one of the best run and most profitable railroads in North America.

How did it accomplish this remarkable feat? Simple, really (although not necessarily easy). To attract customers, you have to offer them value. To do that, you have to provide good service at an acceptable cost. To do that, you have to control your own costs. To do that, you have to minimize the number of assets you own and maximize utilization of the rest.

In other words, you run a tight, effective, efficient operation. All the myriad processes involved in the overall operation must be fine-tuned until they're running like proverbial Swiss watches. But, most important, each must run in synch with all the others.

This is the "precision" railroad. With the precision railroad, daily operation is run to much higher standards than those of the "scheduled" railroad. Common to them both is the need to manage train performance, which includes both scheduling and trainload. Trains must run on time in order to meet customers' needs, and trains must also maximize their productivity on each run by filling all available slots for traffic.

However, the precision railroad differs from the scheduled railroad in that it focuses on the carload – the customer's shipment – rather than on the train. Customers don't care if a train is late, but they do care if their shipments are late.

56 Precision railroading:
Highly precise planning
coupled with disciplined
execution, synchronized
across many different
processes.



Focusing on the shipment, managers examine each and every process that affects its delivery, constantly fine-tuning those processes. And because every other aspect of train operations, whether locomotive distribution, crew management, car repair or track maintenance, exists to keep those shipments moving, the discipline to make things run like clockwork permeates the entire company.

Why Traditional Railroading Doesn't Work (and Precision Does)

TRADITIONAL railroading

The Service Plan

- A guide
- A train schedule
- Created by Transportation
- Focuses on train performance

Crisis management

- Working distractedly
- Putting out fires
- Less safe environment

Bureaucratic control

- Focuses on rules, requires enforcers
- Rewards the wrong behaviors: bossiness, selfishness, in-fighting

Focuses on cost cutting

Network undermined by unintended consequences; local operation optimized

PRECISION railroading

The Service Plan

- Is sacred
- Integrates all processes
- Involves all departments
- Focuses on car performance

Management by exception

- Predictable
- Knowing what to expect
- Safer environment

Guiding Principles

- Values leadership and initiative
- Rewards teamwork and sharing knowledge, information and credit

Focuses on cost control

Network nature of railroading respected; whole operation optimized

Stories from the Field

The Staggers Railroad Act

Before we continue, let's first get an historical perspective on the railroad from Bob Wedam, of Rosemont, Illinois, and see what we can learn from its implications.

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In the United States, rail has the dubious distinction of being the first industry subjected to economic regulation. The rigid regulatory climate controlled and complicated almost every aspect of the business. Rail marketing had more to do with legal maneuvering than with supply-and-demand in competitive markets.

Regulators were shockingly slow to act, and blind to the damage of their own heavy-handedness, with the result that railroads adapted poorly to a rapidly changing postwar world and the spread of interstate highways. As railroads deteriorated, investors shifted their investment capital to other industries with better potential for earning a competitive return.

In the wake of several high-profile bankruptcies, Congress passed the Staggers Rail Act which economically de-regulated railroads in two critical respects: (1) allowing carriers to compete on the basis of price and service, and (2) allowing carriers to more easily exit losing markets. Although revolutionary for railroads in 1980, these are basic principles under which businesses operate in market-based economies.

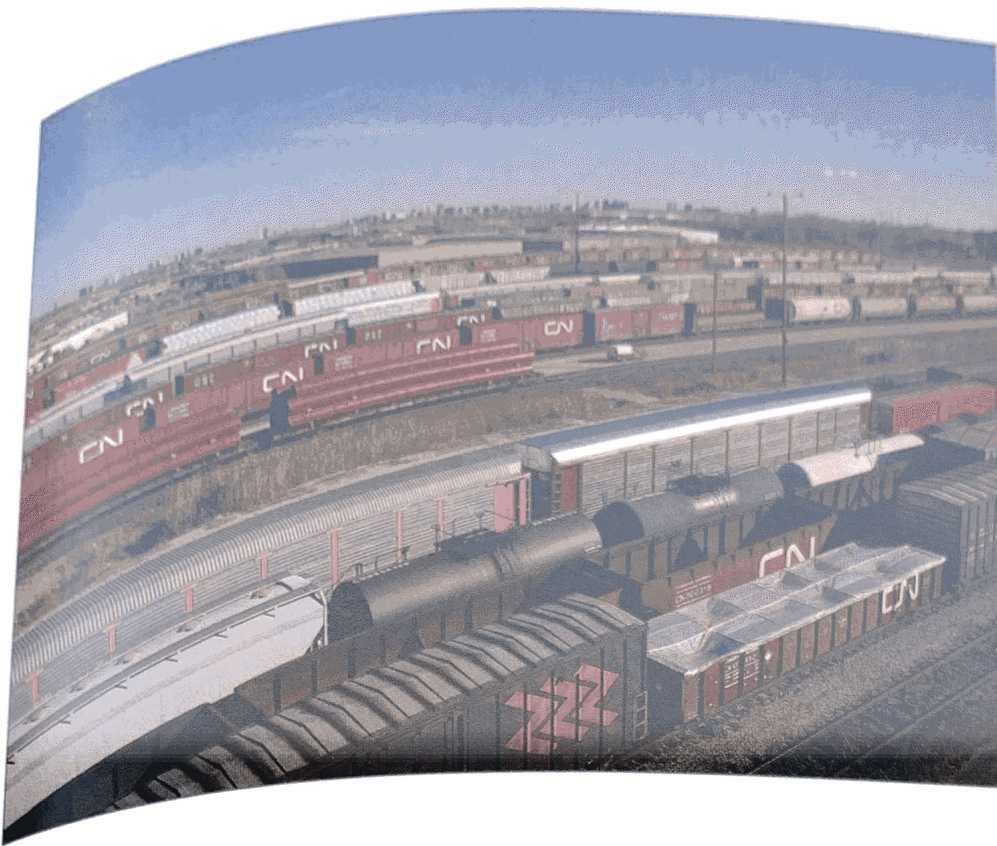
Freed to abandon unproductive lines, railroads could finally move rail and rolling stock to more productive uses. But there was a catch: there weren't enough productive uses for all the accumulated assets. The railroads were awash in very long-lived assets (track, locomotives, and cars), left over from decades of investment decisions based on, and distorted by, regulatory cost-plus pricing. The results were a terribly damaging railroad mindset that assets, once acquired, are "free," and a cash-chasing downward spiral, often pricing service only to cover their high operating costs.

This "assets are free" culture is the most persistent and damaging legacy of a century of rail regulation. Which is why asset utilization is so fundamental to precision railroading.



VOICES

Bob Wedam
Rosemont, Illinois



- ▶ Railroads are very capital-intensive. Every \$1.00 of rail revenue requires about \$2.50 in underlying net property, plant and equipment. In contrast, every \$1.00 of truck revenue requires only about 40¢ in company-owned assets. The roads are paid by your taxes.
- ▶ Because rail assets are very long-lived, capital decisions must be made very carefully because we live with the consequences a long, long time.
- ▶ The larger the asset base, the more expensive it is to own, maintain and operate – and the greater the pressure on cash flow. (Think of what it takes to own and maintain a 5-bedroom house versus a bachelor apartment. More of everything!)

Capital markets (both debt and equity) are efficient and unsentimental. If you believe one of your personal investments is earning a low return, you'll likely shift to another investment with better risk-return potential. Likewise, if investors believe a company has a casual attitude toward assets, they'll shift their debt or equity capital to another company with a better risk-return potential.

Railroads need access to capital. The more efficiently we use it, the more likely investors will lend it to us. In today's business climate, where reported earnings at some public companies have become suspect, investors are more focused on the cash flow statement as the simplest and most honest report card of a company's financial health. A cash flow statement is a company's checkbook. Either you have cash or you don't. And the more cash, the better, providing operating flexibility and financial security. Precision railroading significantly improves the operation and, therefore, cash flow.

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Railroad Operations – The Basics

Running a Class 1 railroad is a hugely complex job, involving thousands of people and hundreds of interlinked and interdependent processes and procedures. Here we take a brief look at how a contemporary railroad works, focusing on the operational aspects – that is, running trains.

Basic Railroad Organization

Basically, a railroad can be organized into three major groups: sales and marketing, which sells transportation services; support services such as information technology, finance, and human resources; and operations, by far the largest function, which runs the trains, providing the services for which the customers pay.

Operations has four main departments: mechanical, which maintains the rolling stock; engineering, which maintains the physical plant (rail, signals, communications, bridges, etc.); intermodal, which transfers containers and trailers between ships, trucks, and trains; and transportation, which operates the trains, assembling, scheduling, and crewing them.

Transportation

Transportation manages the movement of cars, loaded and empty, to and from customers across the network via a myriad of local and system-wide processes. Here, in a nutshell, is how it works:

- Operating crews run their trains on main lines from terminal to terminal, occasionally dropping off or picking up cars for customers directly en route.
- Inbound trains enter terminals where operating crews assigned to work within the terminals send the locomotives to be serviced for the next trip, and take the train apart in blocks of cars. They place the blocks on classification tracks to build another train, or directly onto a local train for delivery to a local customer.
- Local trains (switchers) go out to customers to pick up and drop off cars. When back in the terminal, operating crews in the yard place loaded cars on outbound trains, or on classification tracks grouped by destination or commodity, for subsequent train-building.

- Within the terminal, the crews constantly sort single cars into blocks destined for outbound trains, or break up arriving blocks for local delivery. Cars with problems are flagged and sent for servicing.
- Outbound trains are built from all cars ready to leave for the next destination(s). Once trains are built, locomotives are added and an operating crew is assigned to run the train over the road to the destination terminal.
- Meanwhile, Transportation monitors and manages the movement of every car and locomotive, both to track customer shipments and to ensure that rolling stock is in the right place at the right time.

Although it seems fairly straightforward, it isn't as simple as it looks. Moreover, like any job, it can be done well or it can be done poorly. How do we know when we're doing a good job? Or, more appropriately, when we're doing a poor job so we can improve?

Key Operating Measures

Like any industry, railroads apply certain performance measures to assess their operating efficiency. These measures can be grouped into three categories: service, productivity, and safety.

Service

- **On-time performance.** A measure of each train's adherence to its published schedule, based on its departure from origin and arrival at destination.
- **Trip plan compliance.** The percentage of cars delivered on-time, based on the transit time promised.

Productivity

- **Trailing gross ton miles/Train miles.** The workload performed by trains in terms of tons hauled and distance. This differentiates train efficiency by type.
- **Car velocity.** The efficiency of car movements in average miles per day traveled by loaded and empty active cars on the network.
- **Locomotive productivity.** The productivity of the active (mainline, not in terminals) locomotive fleet in terms of moving the highest level of traffic with the fewest locomotives, measured in gross ton miles per horsepower.

- ▶ **Labor productivity.** The efficiency of our workforce in total weight and distance of customer product moved during a work period, measured in gross ton miles per employee.

Safety

- ▶ **FRA Reportable Train Accidents.** The number of train accidents (on and off mainlines, but excluding railroad crossings) with reportable damage over the FRA established limit, US\$6,700 in 2004.
- ▶ **FRA Reportable Injuries.** The number of employee injuries, including those that entail fatalities, lost time or a need for modified duties.

We will see later how these and other operating measures work and how they show that CN is consistently improving operating performance.

Railroad Economics – The Basics

The traditional (regulated) railroad was basically a “cost plus” operation and, since the customer was pretty much captive, there was little incentive for the railroad to control costs – or, for that matter, to provide good service. In today’s deregulated economy, however, a railroad that operated like that would be out of business in no time.

As we said in the beginning of this book, we’re not in this business just for the fun of it. We’re in it to make money. How does the precision railroad make money? By charging a premium price for a quality service, and by scrupulously controlling expenses. CN’s value to the customer is a combination of price, product quality, service reliability, and convenience. Customers compare our service with alternatives and decide whether it offers value or not. If it doesn’t, they go elsewhere.

Key Financial Measures

In *Railroad Operations – The Basics* we listed a number of the ways we measure how well we perform operationally, but how do we know how well we are doing financially?

“If we run the railroad properly, the business takes care of itself.”

E. Hunter Harrison,
President and CEO,
CN

Here are some of the ways we measure if the business is in fact taking care of itself:

- **Operating ratio.** This is the percentage of operating expenses to revenue and tells us what it costs us to earn a dollar. In 2004, CN's total revenues were Cdn\$6,548M, while its operating expenses were Cdn\$4,380M, giving us an operating ratio of 66.9%. Obviously, the lower the operating ratio, the better.
- **Revenue-to-cost ratio.** To run a profitable business, revenues must exceed costs. Costs can be divided into two basic categories: 1) *variable*, those which vary with the volume of traffic (such as train crews, fuel, rolling stock ownership and maintenance, track maintenance); and 2) *fixed*, those which are the same regardless of volume (for example, infrastructure costs such as buildings, bridges, tunnels, and administrative salaries). The Revenue-to-Cost Ratio, or RCR, is the ratio of net revenue, which is what's left over after adjustments for non-linehaul charges², to variable costs. To contribute to fixed costs, net revenues must exceed variable costs by a comfortable margin. CN's current RCR is in the range of 1.4 to 1.5.
- **Free cash flow.** This is the cash that is generated by the business and left over from our operations, making capital investments, and paying shareholder dividends. It is one of the most important measures for the financial health of a business. The greater the cash flow, the better.
- **Earnings per share.** This shows how much CN earns in net income per share. It reveals whether we're growing shareholder value historically, or in comparison to our competitors or the overall stock market. The greater the earnings, the better for our shareholders.

To learn more about the financial workings of CN, go to our Internet site and look at the *Investor Fact Book*. We will also see later (see *Relevant Measures*) how these and other financial measures show that CN is improving its financial performance as a by-product of improved operating performance.

² Non-linehaul charges include revenue sharing with shortlines, interswitch charges, and haulage fees to trucking companies.

Stories from the Field

Pricing to Value

Often we don't see ourselves being close enough to the action to support it. Nevertheless, we can contribute to customer satisfaction by doing what we say we'll do, ensuring quality processes, maintaining consistency from one transaction to the next, and being easy to do business with. Here's a good example from Vice-president Sales, Stan Jablonski.

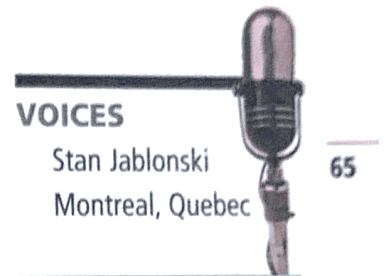
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Sales tries to help improve yield from the cost side. It's typical in this industry to quote a customer an all-inclusive rate. We add up all the services, cost out the whole package, and that's the rate. The problem is that customers' needs change frequently while rates are re-negotiated infrequently. Maybe the customer asks for an extra switch, increasing our costs. Maybe some of the "extras" of the service commitment were predicated on volumes that didn't materialize. Maybe one of the services is costly to provide (e.g., weighing a car), but the customer doesn't value it much, thinking it's a "freebie" that comes with the package. In each case, the yield, calculated at the time rates were set, has deteriorated.


The solution is to un-bundle the rate, and price each service separately. Customers benefit by choosing a combination of services that gives them the highest value for their dollar. CN benefits through a better understanding of each customer's definition of value (leading to a stronger partnering relationship) and by reducing our cost of serving that customer through eliminating features that aren't wanted.

We can't manage what we don't measure. Each month Sales calculates the yield for each customer. Is it going up? Is CN's share of the available business going up? When we can answer yes to both questions, we know our relationship with that customer is moving in the right direction.

Market share and yield are based on the value we provide our customer. We don't necessarily want 100% of a customer's business. Given the law of diminishing returns, there's a point where the cost of delivering truck-like customization doesn't improve our margins. That's why we need to understand the customer's definition of value as it relates to our comparative advantages.



You may think you're far removed from the customer. But, take it from someone who spends his days in customers' offices, the quality and reliability of your work ripples throughout and is experienced by the customer. All those impressions – a voice on the phone, the accuracy of billing, the condition of a car – add up to an overall perception in the customer's mind of who we are.



Typical Problems in Railroad Operations

Let's now take a closer look at some typical day-to-day operating problems that illustrate the constant juggling act of trying to live up to short-term operational measures (service, productivity, safety) while trying to achieve financial goals that require a more long-term, network-wide perspective.

For too many years, the traditional approach was to treat the symptom of a problem, not the cause, sacrificing long-term viability for a short-term gain. The precision railroad looks at root causes and fixes them, no matter how painful.

Locomotive Fails on the Road

Having the main line blocked by a power failure is so disruptive that management will go to great lengths to avoid it. The traditional response is to add backup power to main line trains. This short-term "insurance policy" inflicts enormous capital costs on an already highly capital-intensive industry. As a consequence, backup locomotives are not available for volume growth, resulting in a perceived "need" for more equipment, which requires raising more capital.

What if locomotives didn't fail on the road?

Connecting Train is Late

This is the railroad's lesser-of-two-evils dilemma. The traditional response is to hold train #1 for train #2's late arrival. This protects the interests of train #2's customers, but at the expense of train #1's customers, who aren't served as a result of the late departure. A domino effect begins here and is repeated almost endlessly for down-line trains.

Terminal managers schedule manpower and physical assets based on scheduled arrivals. Productivity is lost when idle employees wait for a late train, compounded by too few employees available when the train finally does arrive. Also, at crew change points, crews are delayed in being called to duty with a hidden cost to them in planning their rest.

In deciding to hold a train for late connections, the trainmaster has three options, all bad: (1) Use overtime to work the late train, thus increasing operating expense; (2) redirect crews from another train to service the late train, thereby spreading the problem; or (3) hold the late train for tomorrow's crews and connecting trains, causing yard congestion and reducing switching efficiency. This further results in a perceived "need" for more track, which requires raising yet more capital.

What if trains arrived and departed on time?

Empties Don't Arrive on Time for Loading

This is a classic example of treating the symptom instead of the disease. When repeated apologies become meaningless, the traditional response is to offer the angry customer an inventory of empty cars held at or near his plant. While the customer may be appeased, idle cars are unavailable for other revenue loads, producing a perceived "need" for more equipment. Moreover, empties on the track render it unavailable for productive uses such as switching or spotting, which results in the "need" for more track. Finally, operating expense rises as empties are first switched onto storage track, requiring ongoing monitoring, then switched again to the loading dock.

What if empties arrived on time for loading?

Misplaced Focus on Track Speed

We sometimes make decisions that have unintended consequences because we fail to consider the full effect. For example, because light, high-speed intermodal or merchandise trains compete directly with trucks, the traditional response is to support this traffic with high track speeds. And if delayed in the terminal, to try to make up time on the road. Consequently, track speed can become an operational objective.

Traditional responses often have the effect of solving one problem while unintentionally creating others.

But if the track supports both light, high-speed traffic and slow, heavy bulk trains, this strategy can backfire by reducing the life of the rail. Curves must be elevated (banked) so that fast-moving trains can maintain speed. Slower, heavier trains wear down banked rail much faster, driving up both operating and capital expenses.

Eliminating terminal delays will have a greater overall impact on improving car transit times, permitting a better balance between the need for speed and track life in mixed-freight corridors.

What if the focus wasn't on train performance?

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What does it cost?

One mile of track, which is what it takes to store about 100 cars, costs US\$1 million.

Surplus Rolling Stock

Typically, we store surplus equipment for use in periods of peak demand. But ownership costs (lease payments, interest on debt, property taxes) continue. Worse, idle rolling stock sits on track now unavailable for more productive uses, such as switching or spotting, which results in a perceived "need" for more track, which requires going to investors to raise more debt or equity capital.

What if there was no surplus rolling stock?

Delayed Switch Lists

Switch crews in a yard can't effectively work an arriving train without a switch list detailing where each car of the incoming consist needs to be placed for its outbound destination. Yard clerks prepare the list, but any delay in this fundamental task means switch crews are idle and terminal dwell time lengthened unnecessarily.

What if switch lists were ready the minute the arriving train entered the yard?

Long-standing TSOs (Temporary Slow Orders)

Temporary Slow Orders are not in themselves problems. Track integrity depends on Engineering forces identifying potential problem areas, and safety depends on having them err on the side of caution when in doubt.

The problem arises when Engineering doesn't follow through quickly to bring the track back to normal speed. Locomotive engineers must begin slowing a train a mile or more in advance of the



work block. After clearing the work block, they must then throttle back up to speed. As a consequence of this fuel-guzzling maneuver, fuel expense goes up. And because every train has to laboriously walk through the work block, the longer the TSO persists, the greater the negative impact on productivity and fluidity, causing congestion in the network and unintended consequences for customers.

What if Engineering brought track up to standard faster?

Interline Carrier Can't Accept Train

Every operating manager at or near a major interchange knows the helpless frustration that arises when another carrier withholds permission to enter their yard to deliver a train, often because of their own problems of congestion. Traditional responses include complaining, arguing, cajoling, or praying. Or in a feud mentality, getting mad

now and getting even later. Traditional railroading exacerbates this situation and offers no good solutions.

What if interline exchanges were as seamless as those between our internal divisions?

Disgruntled Customers Demand Concessions

Typically, customers disappointed by service will demand lower rates or some form of special treatment. At the root of this problem is the railroad mindset that Operations manages the trains while Marketing manages the customers. Consequently, the traditional response is to send in the Marketing/Sales rep who must answer for, but cannot control, operating failures.

Regrettably, appeasement is the name of this game. Quality of revenue and margins are at risk. When additional services are offered as “freebie” pacifiers, operating expenses rise.

Without Operations decision-makers acknowledging failures and designing mutually beneficial solutions, Marketing has fewer options in managing a difficult customer relationship. It also risks exacerbating the problem if Marketing proposes a solution that Operations may not be able to deliver.

What if we always did what we said we'd do?

What If We Had a Better Way

Unfortunately, the problems described above are just the tip of the iceberg. Railroading is a complex business, and the path to flawless operation is steep and littered with band-aid solutions, compromises, finger-pointing, knee-jerk reactions, neglect, and wrong turns.

But what if there was a “master plan” that anticipated all these problems (or as many as humanly possible), and provided a set of guidelines so that a manager in the field who followed them would know exactly what to do 80% of the time or more? Well, that's exactly what the precision railroad does have.

It's called the Service Plan.

Stories from the Field Put the Big Rocks in First

Many of you have heard me relate the story of the importance of "putting the big rocks in first." It is a story I came across a number of years ago. It has a powerful message that I would like to share with you.

A university professor was lecturing a class on the subject of time management. One day, as he was speaking to a group of business students and, to drive home a point, he used an illustration I'm sure those students will never forget.

As this man stood in front of the group of high-powered overachievers he said, "Okay, time for a quiz." Then he pulled out a one-gallon, wide-mouthed mason jar and set it on a table in front of him. Then he produced about a dozen fist-sized rocks and carefully placed them, one at a time, into the jar. When the jar was filled to the top and no more rocks would fit inside, he asked, "Is this jar full?"

Everyone in the class said, "Yes."

Then he said, "Really?" He reached under the table and pulled out a bucket of gravel. Then he dumped some gravel in and shook the jar causing pieces of gravel to work themselves down into the spaces between the big rocks. Then he smiled and asked the group once more, "Is the jar full?"

By this time the class was onto him. "Probably not," one of them answered.

"Good!" he replied. And he reached under the table and brought out a bucket of sand. He started dumping the sand in and it went into all the spaces left between the rocks and the gravel. Once more he asked the question, "Is this jar full?"

"No!" the class shouted.

Once again he said, "Good!" Then he grabbed a pitcher of water and began to pour it in until the jar was filled to the brim. Then he looked up at the class and asked,

VOICES

E. Hunter Harrison
Montreal, Quebec



“What is the point of this illustration?”

One eager beaver student raised his hand and said, “The point is, no matter how full your schedule is, if you try really hard, you can always fit some more things into it!”

“No,” the professor replied, “that’s not the point. The truth this illustration teaches us is, if you don’t put the big rocks in first, you’ll never get them in at all.”

You have to ask yourself, what are the big rocks in your life. Is it your God, your family, your church, your job. What are the important things that you have to get done? Make sure you do these first or the small issues of life will eat your time. If you do the big rocks first, the rest will follow.

Do you notice the same thing at work? A thousand little issues chew apart your day until you look at the clock and wonder where the day went. It happens all the time. You can change that too! Figure out the three to five things that you can do today that will make a difference and don’t let anyone or anything distract you from achieving them. Be relentless.

We will all be happier people, more effective and more in control of our lives if we rise above the fray and put the big rocks in first. So spend some time each day thinking about your own “big rocks” and make sure they are first in the jar.



Part 4

The Service Plan

Introduction to Service Design

A fundamental flaw of traditional railroading (and to a lesser degree scheduled railroading) is the belief that we must choose between superior service and low cost, that you can't provide good service and still make a profit. This stubborn mindset blinds us to two truths: (1) that efficiency is a critical component of service quality, and (2) that doing something efficiently is less costly than doing it inefficiently.

To provide good service at an acceptable cost we need a set of rules that governs the operation of the railroad at both local and network levels. The Service Plan is such a set of rules, designed to help us deliver the service we promised while managing the railroad's assets in a manner that reflects a total cost approach. Only by adopting a total cost approach can we maintain a network perspective on all operating activities. Although an action might make sense to a local manager, the total cost approach forces us to examine its consequences on the network. By putting the network first, we guard the interests of the business as a whole, achieving the highest service reliability at the lowest operating cost.

74 By putting the network first we achieve the highest service reliability at the lowest operating cost.

"There's a fine line where service and costs balance. It's like a seesaw. Service designers, and their day-to-day sidekicks, the general superintendents, huddle at the fulcrum. Their job is to shift their weight a little one way then the other to hold the balance."

Mack Barker, Edmonton, Alberta

Service Design Principles

The Service Plan consists of seven basic service design principles. While these design principles are subordinate to, and complement, CN's five guiding principles, they most directly support Asset Utilization.

The seven design principles are:

1. Minimize car dwell time in yards.
2. Minimize car classifications.
3. Use multiple traffic outlets.

4. Run general-purpose trains.
5. Balance train movements by direction.
6. Minimize power requirements.
7. Strive for steady workload flow.

Taken individually, each of these principles is basic and obvious. However, due to the complex interconnectedness of rail operations, optimizing one doesn't necessarily optimize the rest. In fact, too great a focus on any one principle can have a negative impact on others. Balance is the key.

A Network Imperative

Everyone who has a stake in developing the Service Plan gets involved to ensure that their functional interests are represented, and that the demands on them are achievable. Give-and-take among participants guarantees that the Service Plan sets high but realistic expectations that are understood by all.

Focusing on symptoms risks developing a Service Plan with unrealistic objectives, whereas focusing on root causes of problems results in a Service Plan that is challenging but do-able. No plan is perfect, nor will it make everyone happy. Questioning the plan is all right, but *plan bashing is not allowed*.

The Service Design work unit is a team with no territorial imperative. Their work is 30% technical analysis and 70% communication. They listen, make decisions, and argue persuasively to achieve buy-in; they don't impose their wills. Their decisions are based on facts, and responsive to people's input and intuitions.

Since the goal is to "do the right thing" for the network, the team helps assess the effectiveness of the Service Plan through objective measurement, interim problem-solving with field management, and the development of strategic initiatives.

While overseeing a complex network requires a relatively small number of centralized decision-makers at Network Operations, managers in the field must execute the Service Plan. This demands local accountability, leadership at all levels, and less "following orders."

However, in the end it is the Service Design work unit that must ultimately choose the optimal solution. This arrangement is superior to decision-making among peers, which depends upon

negotiated compromise (where everybody gets something, but the network gets something less than optimal) and/or a strongman who acts as tie-breaker.

Design Vs. Implementation

Designing the Service Plan involves considering all traffic proposals and options, stacking these against the resources available (crew, rolling stock, terminals, etc.), and designing both a schedule

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and set of operating protocols that work, ultimately achieving a balance that encompasses all factors across the network.

The Service Plan is a living document, and a healthy tension between centralized design and decentralized execution ensures it doesn't stagnate. Because designers and implementers need each other, each must understand the other, creating a commonality of purpose in identifying problems and following up on plan deviations via root-cause analysis.

Commonality of purpose ensures everyone is moving in the same direction. Jim Collins, in his book, *Good to Great*, calls this "creative duality... a culture of discipline. On the one hand, it requires people to adhere to a consistent system; yet, on the other hand, it gives people freedom and responsibility within the framework of that system."

Separation of design and implementation ensures that short-term conditions don't unduly influence decisions with longer-term implications. If capable officers are accountable for the parts of the Service Plan that affect them but they don't have influence in its creation, we lose their support, and the plan is undermined as field managers try to fix problems at the local level. The plan's strength comes from two-way feedback: the field is only a phone call away from explaining a recurring problem, suggesting an enhancement, or venting accumulated frustrations.

The interactive nature of the Service Plan design process benefits all parties. Service designers gain greater insight into local operating capabilities and issues, and receive early alerts to possible flaws. Through field management's questioning the plan's logic, service designers are encouraged to strive harder for a workable plan.

Field managers gain greater insight into factors driving decisions outside their span of control, meanwhile exerting real influence on the plan, understanding they're appreciated but not penalized for the demands we make on them for the greater good of the network.

To make the network run efficiently, long-range design and short-term problem-solving must both embrace the total cost approach based on understanding and tracing system-wide implications.

The Service Plan is considered sacred. But what if there's a good case for changing the Service Plan? Who does it?

The Service Plan synchronizes all processes connected to the movement of cars, thus linking operational decisions to the bottom line.

To avoid unintentionally raising costs or lowering efficiency somewhere else along the line, any adjustments to the Service Plan must be made from the network perspective. Whether we're talking about a long-term permanent change or a short-term exception, about holding trains or moving them early, or changing the blocking plan, the Network Operations Center makes the final decision. Their total cost approach focuses on the measure which drives behavior at the local level that yields the least-cost solution at the network level.

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Long-range design and short-term problem-solving must embrace the total cost approach.

“When we implemented the Service Plan in September 1998, the word from Hunter was clear: only the General Superintendents in Network Operations were authorized to make adjustments to the Service Plan. Their job was to review suggested/requested exceptions to the plan with respect to downstream effects on work blocks, crews, locomotive turnarounds and delivering on our commitments.”

Albert Nashman, Edmonton, Alberta

Service Design Principles

Design Principle #1

Minimize Car Dwell Time

Cars are a costly asset. The average boxcar, for example, costs about Cdn\$70,500 (US\$58,000). Naturally, then, we want to maximize their use.

We measure car use in car velocity, which is the average miles per day traveled by a car. The faster the car cycle, or how fast a car “turns” from empty, to loaded in service, to empty again, the greater the car velocity. In other words, the more it’s being used.

One way to turn cars faster is to run trains faster, but in reality cars spend only a fraction of their lives on trains. They spend much more time in yards waiting to be sent out on a train or to a customer. The amount of time a car spends in a yard is called dwell time. So the best way to influence car velocity is to reduce dwell time.

First, though, we have to understand why cars spend so much time in yards.

A car sitting in a yard
isn't earning its keep.

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We begin by analyzing local historical traffic flows and market forecasts. Think of a yard as a hub with a continual inflow of cars along spokes from local switchers, mainline trains, and other operations within the yard. Historical traffic flows and market forecasts give us traffic volume and direction (in or out), while customer switching tells us when the traffic will arrive at the yard.

From this data, Service Design develops a blocking plan for each yard, and a train plan to link the yards together. The overall network Service Plan is the combination of all yards' switching plans (cars moving to and from customers), blocking plans (groups of cars going to other yards), and train plans (the trains to which the blocks can be assigned).

Next, Service Design tweaks the plan, optimizing as much as possible the flow through each yard and across the network. The more balanced and steady the flow, the better for both the yard and the network.

What does all this mean at the yard level?

As cars arrive at a yard, the field manager and his team apply an agreed-upon yard standard (the time it should take for all switching and related functions). From this they know when each car should be available to leave the yard. A typical yard standard is eight hours.

Knowing their yard's blocking plan and the destination of each car, they assign the car to the block that gets it as far as possible along its route before it has to be handled again. Knowing when that block is scheduled to leave on a train, they know if the car is going to make today's connection or not. If the cars won't leave until tomorrow's train, they add 24 hours to the cars' dwell time. That's because, except at larger hubs, there's often only one best-connecting block per car per day.

A yard's average dwell is the sum of all cars' actual dwell times, typically something like 20 hours. Yard operation is at its best when its overall average dwell is as low as possible. The Service Plan provides the manager with comprehensive and precise information regarding expected inflows, the ideal blocking plan, etc. He doesn't have to re-invent the wheel every day.

Minimizing Dwell Time – The Basics

Here are some strategies for minimizing average car dwell time:

- Move large blocks ASAP. This is built into the train plan and it's in the yard's best interests to make sure those blocks get built and out on time.
- Stay focused on incoming cars with the tightest connections to their outbound blocks. This will create the greatest number of successful connections.
- The better you get at making the tight connections, the more buffer you have for managing unexpected or disruptive conditions (such as bad weather, accidents, etc.), thus improving overall reliability and protecting the trip plan.

The common characteristic of these strategies is that, in each case, net car productivity improves – for real.

But remember, some actions that are right for a yard may be wrong for the network. For example, if the goal were simply to minimize the time a car spends in the yard, wouldn't it make sense to reassign a car that missed its connection to another block headed in the same general direction? The simple answer is "No." As we'll see in the next section, less-than-optimal blocking requires a car to be handled more than necessary. This just passes the buck, creating work elsewhere, raising total costs, and lengthening total transit time, which risks failure of the trip-plan and our commitment to the customer.

Similarly, a yard that has become so good at processing arrivals and building new trains may actually have to hold a train, sometimes for hours, until its scheduled departure time. Holding the train may create congestion and increase the yard's average dwell time, but sending the train out early may result in it doing the same in another yard.

For example, MacMillan Yard in Toronto is at its best when trains arrive at 40-minute intervals. Trains arriving more frequently actually drive Mac's overall efficiency down. Yes, we'd like to help a yard get full credit for its efficiency, but the real driver is "what's best for the whole network."

Making tight connections
keeps cars moving.

Stories from the Field Fast Turns

Although the bulk of this section is about car dwell in yards, it's not much of a stretch to think of customer sidings as extensions of the local yard. Here's Tom Goodwine again with a story about turning cars – and his customer's head.

.....
We had a customer who was kind of cantankerous. One time he lit into us hard for letting a cut of cars sit on the siding outside his plant, for X number of "blankety-blank" days.

It's true, he was looking at the same cut of cars. What he didn't realize was that we'd picked up the cut, delivered them to his customer, went back for the empties, and spotted the same cars back on the siding for his next load. The whole turn had been so fast, he didn't bother to check it out. He just assumed it was a screw-up. It just didn't occur to him it was even possible to turn 'em that fast.

Somewhat red-faced, the customer had to admit we had done a pretty good job.
.....

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VOICES

Tom Goodwine
Homewood,
Illinois

Design Principle #2

Minimize Car Classifications

Minimizing car classifications also improves the car cycle and increases car velocity, allowing us to use cars more productively and ultimately reduce the number of cars we need to service our customers.

What do we mean by car classification?

When a car or block of cars arrives at a yard, either from a customer or on a train, it is assigned to another block (or it may be a block unto itself) based on its destination. Because we know where the car or block of cars is coming from and where it's going, we can plan in advance which block it must be assigned to in order to continue its journey. This is the blocking plan and the process of assigning cars to blocks is car classification.

Cars are classified by Originating and Destination points, or O&Ds. CN has more than 200,000 O&D combinations. Although

this is a daunting number, about 5% of these O&D pairs account for more than 80% of CN's traffic volume. Optimize that 80% and the remaining 20% pretty much takes care of itself.

To appreciate car classification, consider the extremes of railroading. One extreme is the totally customer-driven railroad. With each order, we'd initiate a train that would proceed directly from the customer's dock to car destination. In other words, every train would be a special train, with no economies of scale.

The other extreme is the totally operations-driven railroad. We'd hold all trains until enough cars had accumulated to fill each, thus ensuring that train capacity is maximized. The optimal solution, however, is somewhere in the middle, a balance of the extremes.

How do we find that balance? By classifying cars into special blocks (as opposed to special trains) based on origin and destination.

Forward/Backward Problem Solving

In the preceding section, we likened yards to hubs with traffic flowing in and out along spokes and moving between hubs (along axles, if you will). A different analogy would be to see the flow of traffic across the system as a great river fed by hundreds of smaller tributaries. If we choose a major destination such as Chicago and map 100% of the terminating cars back to all their sources, it quickly becomes apparent where tributaries start to overlap. These intermediate points (terminals) between origins and destinations offer logical blocking opportunities. That's backward problem solving.

In forward problem solving, we consider train size. Starting at each origin and moving toward a destination, we can determine at what point is there enough traffic to justify a dedicated train that will run straight on through to the final destination.

For big flows, we want to block as close to origin as possible. If all cars bound for the same destination can be grouped together, they constitute a good portion of a train, and will require less handling en route.

For small flows, we make generic blocks and run them as far as possible toward destination. At intermediate points where small blocks from other tributaries join the main flow, we group them into large blocks. The goal is to minimize the number of times we handle

The blocking plan groups cars based on destination.

an individual car, assign it to a logical block and leave it there until we're at or very near final destination.

No blocking plan is perfect. Traffic patterns continually change, invalidating an existing plan while creating new blocking opportunities. This is where service designers are challenged to stay on top of their game and keep challenging each other to take a fresh look at even the most familiar traffic flows.

Car Classification – The Basics

If you're the manager of a receiving yard, your best possible solution is to get all incoming traffic already blocked. You'd like your colleagues at upstream yards to do as much of your work as possible. That minimizes the cars to be handled within your yard and therefore minimizes the number of people and assets you need.

If you're the manager of the upstream yard, you want to create the fewest number of blocks possible, since this minimizes the amount of work your people have to do.

The total cost approach provides the network perspective to find the best balance between these conflicting local objectives.

Design Principle #3

Use Multiple Traffic Outlets

By minimizing car dwell and classification, we seek to improve a car's velocity (productivity) by reducing total turn time. "Multiple traffic outlets" means having more than one way of moving cars to a destination.

If the O&D block is large enough, it can become a destination-specific train, bypassing all intermediate yards and reducing both transit time and car handling. And once we establish this service, car-trip plans reflect this more attractive, non-stop transit time, a benefit for Marketing in pitching this service offering. But railroading, like life, isn't always that simple and straightforward.

For example, let's say that every day, on average, Edmonton receives enough cars to justify a dedicated train to Chicago. This looks like a compelling idea, but "on average" means the train will run short some days and overflow on others.

Running short is a problem of train efficiency, rather than of service. Our "product" (train capacity) is highly perishable. As soon as that train pulls out, its unused capacity is gone forever. There's nothing you can do about it. Overflow, on the other hand, is first and foremost a problem of service, which can also affect efficiency. You have some options, though.

One, you could hold the overflow for 24 hours until tomorrow's Chicago train. However, this causes a service (trip-plan) failure and risks making the problem worse if tomorrow's train is also overbooked.

Two, you could run an extra train. This protects the trip plan, but at substantial cost in additional locomotives and crews. The unplanned train creates imbalance (see Design Principle #5) in the network that will require deadheading the locomotive and crew back to restore balance. We'll run an occasional extra, but only as a last resort, never as a "quick fix" for a recurring situation.

Or three, you could assign Edmonton's overflow as a Chicago block and send it to Winnipeg to connect with one of their Chicago blocks. However, unless field management can foresee excess demand early enough to take front-end action, this risks trip-plan failure because of the unplanned connection. For example, on a day Edmonton anticipates overflow, it could siphon off a block of Chicago-bound volume and shoot it out to Winnipeg, well in advance of Edmonton's non-stop. With early release of cars, this one-stop, back-up plan has a chance to keep those cars' total transit within the original, non-stop trip-plan commitment. This may preserve both service and efficiency, but requires some fancy footwork, including a foolproof, early-alert system and good guesswork on incoming volumes in order to siphon off the right number of cars.

All these options have disadvantages that must be addressed. Running an Edmonton-Chicago non-stop may still be your best solution, but you can see how important it is to have a reliable back-up plan everyone understands how and when to initiate.

Running short wastes train productivity; overflow risks service failure.

An Alternate Approach

Before committing to the dedicated train, however, let's consider another alternative.

Each day Edmonton runs (at least) one train to Chicago and another to Winnipeg (for all non-Chicago traffic). What if we sent both trains to Winnipeg at 12-hour intervals, each with Chicago-bound blocks?

The disadvantages of this strategy are the flip side of running non-stop:

- It's slower.
- It increases the risk of trip-plan failure.
- It runs the risk of wasting train capacity. If you divide Chicago-bound cars into two blocks, both blocks may not be big enough to consistently support two trains. Remember, this scenario is based on the average Chicago-bound traffic arriving in Edmonton.

But this strategy also has advantages:

- Thanks to the law of averages, it generally eliminates the dual problem of short trains on one hand and overflow on the other. The more general the train, the more likely the normal ups-and-downs of traffic flow will offset each other. A surge of traffic going to Chicago may be offset by light traffic going to eastern Canada. The larger the network, the more likely that offsets will reduce the absolute number of overflow situations requiring exception handling.
- The cars can still be transit-time ahead as long as they don't sit in Winnipeg for 12 hours. With only one Edmonton-Chicago train (outlet) per day, "half" the cars sit in Edmonton for 12 hours awaiting the privilege of riding non-stop. Alternately, if Chicago blocks can get in and out of Winnipeg in less than 12 hours, car velocity can be enhanced. This should be doable, since Winnipeg is a large collection center for western Canada, sending out as many as three Winnipeg-Chicago non-stops each day, offering all upstream terminals, including Edmonton, multiple outlets for Chicago-bound traffic.

CN's service commitment is to promise only what we can reliably deliver. Customers aren't impressed with averages. An

early car is often as bad as a late car. While this strategy may appear less attractive than an Edmonton non-stop, it may be more predictable in doing what we say we'll do.

Another benefit of this strategy is its standardization (doing it the same way every day), compared to the non-stop's overflow backup plan used some days but not others. In this strategy, each of the blocks is a built-in backup to the other.

In this example, there is no clear right answer, but in the real world of railroading there aren't many "no brainers." Assessing all the options, however, often reveals pros or cons that will shift the equation one way or another.

Using Multiple Outlets – The Basics

Sending yards want to get cars out as soon as possible, to lower their average dwell and minimize congestion. They'd vote for general trains (multiple outlets). Receiving yards like destination-specific trains to bypass them because it's less work and eliminates the risk of trip plan failures.

Note that almost every receiving yard is also a sending yard. So, the "receiving" yard should be careful what it wishes for. The bypassed yard has fewer outlets (options), less flexibility, and subtly higher risk, with respect to protecting its own traffic.

Wherever the analysis results in a close call, service designers and field management must keep a keen eye on shifting traffic patterns, which can subtly change the optimal solution over time. Again, CN's total cost approach provides perspective and encourages us to probe more deeply, to stay focused on car velocity. A true net gain in asset utilization requires enhancing productivity across a car's entire O&D.

Design Principle #4

Run General-Purpose Trains

The term "unit train" generally refers to one dedicated to bulk traffic, such as coal or grain. Unit trains are often considered an efficient, low-cost alternative to general freight rail service. This is founded on the belief that unit trains provide faster transit times by

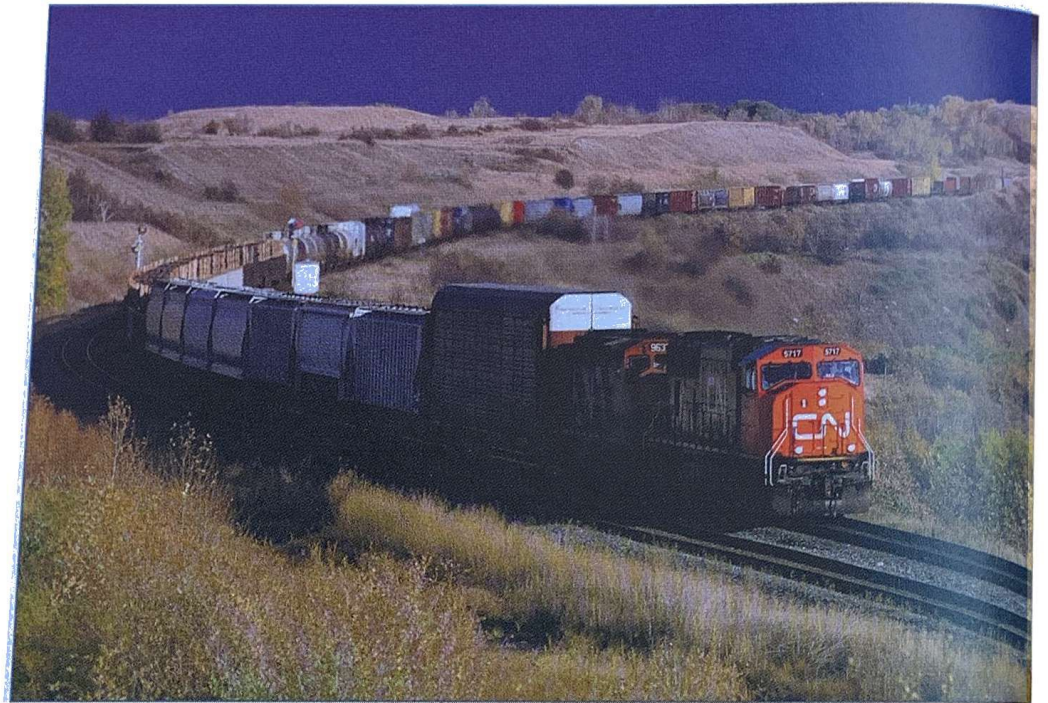
Using multiple outlets increases flexibility and lowers risk.

avoiding intermediate handling, and that the simplified Service Plan saves train-operating expense. However, CN's total cost approach reveals that the opposite is often true.

Unit trains are special-purpose trains, and special-purpose trains are efficient only when the following conditions exist:

- Loading and unloading times are less than 24 hours each.
- Trains cycle in a closed loop between a specific origin and destination.
- The train operates seven days a week in each direction.

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Unit trains work only when certain conditions exist.

When one or more of these conditions isn't met, the economics of a special-purpose train diminish. Inefficiencies arise due to increased in-transit inventory, poor car velocity, and locomotive or crew imbalances. Often the cost of these inefficiencies is not allocated back to the unit train, but rather to operating overhead. This lack of a total cost approach results in misleading economics for the unit train option.

CN's precision railway approach strives for train balance, which is achieved when equal numbers of trains operate in both directions in a corridor. A balanced operation creates efficiency wherein both crews and locomotives are used productively in both directions without deadheading (see Design Principle #5).

When special-purpose trains are introduced to handle the periodic movement of merchandise traffic, a number of inefficiencies enter the operation:

- ▶ **Crew positioning.** When a matching empty train doesn't operate with the loaded train, crews must be deadheaded home, then repositioned again when the empty unit train is ready to move. This can result in train delays and service deterioration, while increasing crew expense.
- ▶ **Locomotive utilization.** Locomotives that haul the loaded train must either wait for unloading to occur, or be deadheaded out and back again when the empties are available. This reduces locomotive productivity.
- ▶ **Car fleet.** The first car loaded must wait until the last car is loaded before it can return to the unloading facility. Similarly, the first car unloaded must wait until the last car is unloaded before it can return to the loading facility. As a result, car velocity is reduced.
- ▶ **In-transit car inventory.** Reduced car velocity (productivity) increases the number of cars needed, elevating inventory carrying costs and private fleet requirements.
- ▶ **Train costs.** If a flow is moved from general freight service to unit train operations, train miles will actually go up if the reduced freight traffic is insufficient to allow removing a train. In such a case, adding a special-purpose train increases the number of train miles operated to handle the same traffic. This reduces overall efficiency of the freight service, with fewer cars per train.

These implications apply to any special-purpose train. Unit bulk trains are the more obvious examples, but a five-day-per-week intermodal operation can be viewed as a type of special-purpose train, with all the same problems of imbalance that a total-cost approach reveals.

Although special-purpose trains can be efficient in certain applications, our operating plan obliges us to focus on achieving operating efficiency, car velocity and high levels of service reliability. Once we consider all contributing factors, general freight service is often more efficient.

Stories from the Field

The Phosphate Train

The problem with good ideas is that they have a way of hardening into conventional wisdom (“bulk commodities run in unit trains”), and people sometimes forget to question if it makes sense in every case. Well, there’s conventional wisdom, and then there’s CN. Listen to Ed Harris of Network Operations describe a dilemma his team encountered over the operation of a unit train.



We had a movement of phosphate rock (used in the production of fertilizer) which we handled in predominantly unit train service from Ontario to Edmonton on an “as needed” basis, 100-120 cars about every four days. This required a special allocation of power, crews and equipment, including an additional train-set supplied by the customer for those “just in case” times. As a result, at its peak there were more than 800 cars in this service.

One day it occurred to us that the average daily move of phosphate was about 25-30 carloads, and we had a daily merchandise train that was running 25-30 carloads light. So, instead of waiting to run one monster unit train every four days, we had the merchandise train pick up 25 cars each day on its way to Edmonton.

Results? Extra assigned locomotives fell to zero, the assigned car fleet was reduced 40%, the customer returned more than 100 leased cars for a substantial savings in their capital requirements, and we’re actually hauling more loads today than we had under the unit train concept. In effect, we created a 1,000-mile virtual conveyor belt of phosphate rock across the Great Plains of Canada, achieving significant efficiencies for both our customer and CN.



Design Principle #5

Balance Train Movements by Direction

Our only “product” is train capacity. It’s a highly perishable commodity. As soon as a train pulls out of a yard, the value of every unused “slot” falls instantly to zero. Therefore, it would seem to make more sense to focus on trainload as a key measure of efficiency.



VOICES

Ed Harris
Edmonton,
Alberta

Train capacity is a highly perishable commodity.



Trainload is important, but it's not an operating goal. If it were, the obvious strategy would be to cancel trains with low load factors. The first to go would be many Saturday and Sunday trains, since traffic volumes typically fall off on weekends. However, focusing on trainload violates CN's five Guiding Principles, especially Cost Control.

Cost Control vs. Cost Cutting

Remember the old Fram oil filter commercial, "Pay me now or pay me later"? Although it might appear that canceling a train saves fuel, it doesn't. Fuel costs relate directly to gross ton-miles, a factor of weight and distance. In canceling weekend trains, all we do is change the timing, that is, when the fuel is used.

Worse, in canceling weekend trains, we actually incur additional costs. When the traffic stops on Friday night, locomotives may be in the wrong place for full schedule resumption on Monday, requiring them to be deadheaded back into position over the weekend.

Similarly, crews may also be left in the wrong place. Instead of working their way home on Saturday on an opposing train, they too have to deadhead or face extra-long hotel layovers. The network is better off when crews work their way home, and crews are better off at home with their families.

Balanced train movement is better for crews and improves cost control.

Striving for Balance

Aside from the false economy, canceling weekend trains means holding accumulated cars over the weekend, which risks yard congestion and increases dwell time. Holding cars also compounds the effects of day-of-week surges, making the operation more volatile. Fewer outlets for the same volume mean less flexibility and smaller margins for error. This increases the risk of overflows (surges in demand exceeding train capacity), which stress the network and require non-standard, exception handling.

Also, recovering from network disruptions (a derailment, storm, etc.) is slower and more difficult. That's why we don't build in excess capacity as insurance. On the other hand, the lighter traffic days that occur naturally in any well-designed Service Plan are natural shock absorbers for emergency response and recovery.

And because any extra, unplanned train (or a canceled train) is a disruption of the Service Plan, the benefits better be substantial in either case or we shouldn't even think about it.

Therefore, we should optimize the Service Plan by balancing train movements to the fullest extent possible, even if it means crossing product lines, such as mixing merchandise with other traffic. In some corridors we have scheduled service built to balance a unit-train operation. Once the plan is optimized, we stick to it and keep day-to-day train movements balanced to the fullest extent possible.

Do we ever cancel planned trains and run unplanned trains? In a system as large and complex as ours, we do it all the time, but never as a "quick fix" to everyday problems. Because the Service Plan is based on total cost, the threshold for making these decisions is high. Adding and subtracting trains is a radical technique for dealing with exceptions: (1) to take advantage of a unique market opportunity on behalf of a customer, or (2) to deal with a serious operational problem and restore the integrity of the Service Plan as quickly as possible.

Balance – The Basics

By balancing trains, Operations managers minimize both costs and excess capacity. Since the "optimal" plan is an ever-elusive target, we continually refine it by studying the train slots that most often go to

waste. Our job is to ask, "Can we find a better solution to further reduce excess capacity?"

Marketing looks at those slots differently, as product to sell. Marketing's job is to ask, "How can we market the slots currently going to waste?" This is a case of complementary rather than conflicting interests.

Redefining train capacity as an asset to be utilized rather than a cost to be avoided profoundly changes our approach. Instead of asking, "Should we cancel service to get rid of unused slots?" we ask, "Can we get someone to pay to use this excess capacity?"

Stories from the Field Crew Deadheading

Once we start to work with the design principles of precision railroading, we sometimes discover applications that allow us to extract even greater leverage. Below, Paul Miller of Network Operations tells us about a problem he faced regarding crew deadheading.

In the last half of 2001, we'd taken an aggressive approach to deadheading, and successfully driven down unproductive deadhead expense and the associated taxi cost. However, an unintended consequence was that held-away times for our road crews at the away-from-home terminals increased substantially. This had undesirable effects on our people, in terms of work/life balance, and their ability to plan their rest periods.

Had we failed to consider all aspects of the equation? Our Chief Transportation Officer (CTO), an experienced scheduled railroader from the IC, quickly deduced that we had; our plan didn't balance all the important elements at play. He challenged us to devise a plan that would at least maintain all the financial benefits we'd achieved, but also reduce held-away times, and give our people opportunities to turn back at the away-from-home terminal.

Many people thought it was impossible and expressed concern that we would increase unproductive expenses by millions of dollars. In an emotionally charged Monday morning meeting, the CTO made it clear that this was not going to happen. He was so sure of this, he'd negotiated an agreement with the BLE and the UTU, which put

VOICES

Paul Miller
Edmonton,
Alberta



additional pressure on us to turn crews quickly. As we left the meeting, those of us responsible knew that (1) we had better consider the crewing plan when adjusting the service plan, (2) tactical train planning had to have the additional discipline of held-away time factored in, and (3) division and network staff had better execute flawlessly.

The result? Deadheading and taxi expenses have been further reduced, held-away times have come down considerably, and crews and Western Operations Centre staff are working together to find opportunities to turn at the away-from-home terminal. A win for CN, for our people, and for our customers in terms of reduced crew delay through balance made possible by scheduled railroading.

Focus on the Commitment

Here's a brief anecdote from Albert Nashman regarding the wisdom of running a tight (and balanced) operation year-round.



It's typical for volumes to fall off around Christmas. A traditional railroad response is to cancel trains and bunch up the lower volumes on a smaller number of starts. But for those customers who are still shipping over the holidays, we'd made a commitment to operate; therefore, we operate regardless of train length. Furthermore, canceling trains might sound like a good idea, but it has unintended consequences up and



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Albert Nashman
Edmonton,
Alberta



down the railroad on connections, crew assignments, and the positioning of equipment. The apparent savings of canceling a train are often offset by less obvious inefficiencies elsewhere.

Design Principle #6

Minimize Power Requirements

A locomotive is the most expensive piece of rolling stock on the railway. A typical mainline locomotive costs Cdn\$2 million or more to purchase, or as much as Cdn\$600 per day to lease. Therefore, we have to make sure we're getting the most out of every one of them, make sure that none of them sits idle for an hour longer than absolutely necessary.

In some respects, managing locomotives is similar to managing car dwell. We must study them when they're sitting still and keep them working as much as possible by speeding up their "turns."

However, because locomotives are much more complex pieces of equipment than cars, as well as indispensable to running a train, managing them is substantially different in other respects:

- ▶ Unlike cars, locomotives have prescribed maintenance requirements and schedules.
- ▶ The arrival of locomotives at a yard is dictated by train schedules, wholly under our control.
- ▶ At small satellite yards, incoming locomotives don't need much handling to be available almost immediately for the next outgoing train.
- ▶ At larger yards with servicing responsibility, availability depends on how quickly incoming power can be cut off and run to the servicing facility for fuel/water/sand, checked over for light repair, and released for outgoing assignment.

Interchangeable Units of Power

Locomotives arrive at yards in fixed chunks of horsepower (e.g., 3,000, 3,600, 4,000, 4,400); therefore, one objective is to allocate traffic to get the best use out of total available horsepower. For the most part, "turning" a locomotive frequently is good, but

Horsepower is an asset;
use it efficiently.

if you never use more than a third of its capacity, you're wasting power with each turn, which isn't so good.

Since it's the horsepower of locomotives, singly or in tandem, that determines train capacity, minimizing unused slots is another way of saying minimize the difference between the pulling power of the locomotive(s) and the work required to haul the train.

Focus on Smaller Locations

Whereas maximizing car utilization requires we pay a disproportionate amount of attention to the bigger locations (hub-to-hub car classification), locomotive utilization requires that we focus on smaller locations.

In dense traffic corridors and at large locations, there's a steady flow of locomotives into a yard, creating a pool of horsepower. In short, the size of the location provides built-in flexibility and a buffer to absorb fluctuations. The Service Plan for these locations has only to dictate the number and type of locomotives required for each outgoing train; assignment and management of power can (and should) be left to local management.

On the other hand, smaller yards are more dependent on the availability of each individual engine. A mechanical failure has much greater impact at a small yard because there's a smaller buffer for error. Therefore, smaller yards rely on the Service Plan to ensure that the right number of locomotives arrive on time, have been properly fueled and serviced upstream, and provide good balance with car cycles and crew cycles. As a result, responsibility for assigning and managing power rests more at the network level, with service designers and the general superintendents.

Weight-to-Power Ratios

Weight-to-power ratio (the horsepower required to pull a given number of cars) is dictated by the geography of the territory to be traversed. On hilly territory, the train must be powered with locomotives whose collective horsepower is sufficient to pull the train up the steepest grade on that territory.

The more horsepower assigned to a given trailing-ton weight, the faster a train can accelerate to get up and over hills. For this

reason, some railroads really power up their trains for faster over-the-road runs. This makes sense in mountainous terrain and, to some degree, with light intermodal trains intended to sprint across the system, directly competing with trucks. However, it isn't a good strategy for most general-purpose trains.

Overpowering trains generates more waste than productive speed. We've already seen how a misplaced emphasis on train speed can reduce track life. Also, in a variation of the "hurry up and wait" dilemma, a faster train may just wait longer in the next siding for a meet. More is gained by minimizing locomotive dwell, through effective design and root-cause analysis of late departures, than can ever be recouped by "making up time" on the road.

Smaller is Better

Keeping a tight rein on the size of the locomotive fleet keeps Service Design's focus where it belongs, on scarce resources. As the plan takes shape, it is fine-tuned to obtain as much productive work as possible from each unit of horsepower. This results in studying *what ifs...*, not as a theoretical game, but to better anticipate real questions that field managers and general superintendents must answer every day:

- ▶ Would breaking one long train with wasted power into smaller trains get a better horsepower match?
- ▶ Would combining two smaller trains into one get a better horsepower match?
- ▶ Are we short of crews, which would favor fewer and longer trains?
- ▶ Would a long train risk network fluidity because of siding-length restrictions?
- ▶ Could a road locomotive with a long unavoidable layover do double duty switching, freeing up a yard engine for redeployment elsewhere?

Locomotive Maintenance

Locomotive maintenance requires mechanical facilities that are capital intensive, with spare parts inventories and specialized tools for diagnosis and repair. Therefore, a railroad needs to minimize



the number of these facilities across the system. Bringing a locomotive to a facility appropriate to its needs requires careful planning to match its assignments with its maintenance schedule.

Ideally, a locomotive should work its way to its maintenance facility, arriving just in time for its scheduled maintenance. If a particular facility is backlogged, however, locomotives originally destined for it may need to be diverted to another facility. Clearly, this requires precision in a locomotive's assignments.

A large number of variables must be taken into account. For example:

- Is everything normal, with respect to traffic patterns?
- Are there abnormal surges requiring additional power?
- Where and how many unscheduled, special-purpose trains must be covered?

And if a locomotive fails, how do you cover it? Do you repair it on-site or move it to a specialized facility? The size of the nearest terminal will determine whether you have a buffer for troubleshooting.

Extreme cold also increases the risk of mechanical failure. Motive power distribution managers must really be on top of their game in winter months, especially on northern territories.

Handling a Power Shortage

In Service Design Principle #1, we strive to minimize the time a car sits in the yard, so getting the train out on time is paramount. But

Locomotives must be in the right place at the right time for scheduled maintenance.

what if you're short of power? If the train is light, no problem, right? Just obey the Service Plan and get the train out on time, because downstream yards have scheduled people and assets based on its planned arrival time.

But the Service Plan also governs power utilization. Because downstream yards count on receiving the right number of locomotives to meet their own power requirements, if you obey the plan, you don't send the train out until it has the requisite power.

So, what do you do? In traditional railroading, local managers weren't equipped to accurately assess what's best for the yard versus what's best for the network. Moreover, field managers tended to be rewarded only for taking care of their own parts of the network.

"Looking good at the other guy's expense? Oh, yeah. That's easy. Kick a train out of your terminal right on time knowing it can get over your district just fine but doesn't have the horsepower to handle the grades of the next district. You just passed the buck."

Tom Goodwine, *Homewood, Illinois*

In precision railroading, the manager confers with one of the general superintendents in Edmonton to determine which is the better solution for the network, sending the train out short of power or holding it until the requisite power is available. After all the factors have been weighed, the action taken will balance what's best for the customer and what's best for the railroad on a total cost basis.

Teamwork is critical to the process. For field managers to reliably include network implications in their real-time decision-making, there must be both mechanism and incentive.

Stories from the Field

The Last Director

So critical is the utilization of the locomotive fleet that the Network Operations Control Center used to include a group dedicated to the task. Not any more. Here's Mike Meleskie of Edmonton, Alberta, on how he did himself out of a job.

.....



VOICES

Mike Meleskie
Edmonton,
Alberta

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On January 1, 1998 we had 1,965 active locomotives on the Canadian lines of CN and more than 30 people whose sole responsibility was managing distribution. As of June 2003 we had 1,179 active locomotives³, a reduction of 40%, even though we were handling more traffic. I was the last Director of Motive Power CN had. The position, which exists in some form on all other Class 1 railroads, no longer exists at CN. We don't need one. Motive power distribution is no longer a network responsibility; it's everyone's.

How did we accomplish such a huge reduction in the locomotive fleet while still being able to handle increased traffic? Every day we examined each train, asking why we put as many locomotives on it as we did. For years it was accepted practice to put two locomotives on all trains in case one failed. However, with the new,



higher horsepower locomotives, many trains could run with only one. So we made sure they didn't fail by maintaining them better.

Trains were also often assigned extra locomotives so they wouldn't run out of fuel. With some experimentation we found that with newer locomotives and better fuel efficiencies, we could increase the distance between fuelling to as much as 1,200 miles. We ran a few trains out of fuel during the trials, but we were allowed to make some mistakes – some.

A lot of great ideas came from the districts. For example, at a not-so-busy location, when a train came in, the locomotive sat idle till the next morning to leave on its next scheduled train. Someone suggested using it to power a regional train that ran out and back over night. They weren't sure we'd let them, but we told them to go ahead, as long as it was back in time for the scheduled mainline train.

Another paradigm shift: There's no such thing as assigned power; it's everybody's to use effectively.

We got to a point where we had reduced the number quite a bit. Trains were running with the minimum number of locomotives, and locomotives were not sitting idle anywhere. But locomotive productivity was stuck at around 225 MGTM per available horsepower, not so good. In addition, we were incurring high train delays on weekends at major terminals such as MacMillan Yard due to lack of availability of power. After one particularly bad weekend of hundreds of hours of delays, there were some not-so-subtle hints that we'd better not let it happen again.

It was Wednesday night. I called my wife and told her not to expect me home. I was determined to stay at work until I figured out what was going on. After hours of poring over weekly records, I found that on Thursday, Friday, and Saturday of each week we didn't have enough locomotives to meet our outbound needs. That was no surprise; everyone was well aware of the problem. What did surprise me, though, was that on Monday, Tuesday, and Wednesday of each week we had too many locomotives. I hit upon the idea of saving some of those extra locomotives for later in the week. I even came up with a name for it: "strategic reserve."

Monday morning I gathered my distributors together and asked, "How many extra locomotives do we need at MacYard by Thursday

night to get through the weekend?" It didn't take us long to come up with a number we could all agree on: 28.

I approached Tom Utroska, VP of Transportation at the time, and showed him the numbers. It wasn't going to be easy to see a train waiting for power and locomotives sitting idly in a "strategic reserve" literally a few feet away, but he said, "I'll support you 100% to see if it works."

By Tuesday night we had 28 locomotives put away with no adverse impact on trains. That weekend we didn't have a single hour of train delay at Mac Yard, nor any serious problems for months after that.

Today strategic reserves don't exist. We don't need them. Power flows are now balanced so that locomotives arrive at a terminal at the same rate that they are needed. There is no longer a need for a large planning group to develop an ad hoc daily plan. Now everyone understands and respects the locomotive flows and the tools that control them. There's no more finger pointing (or hardly ever!), so no longer a need for a Director of Motive Power to act as referee.

Design Principle #7

Strive for Steady Workload Flow

Matching Work and Resources

Service Design Principle #7 strives to synchronize work and resources to avoid surges and lulls. A steady flow of work uses resources more efficiently than periods of no work followed by instant backlogs, which alternately waste and strain available resources. There's hidden cost in lost productivity for idle employees awaiting work, compounded by having too few employees available when work finally arrives.

Service Design's job is to create a plan that levels out the work to the fullest extent possible at every location. The job of field management is to implement the plan as closely as possible. The steadier and more predictable the operation, the better the match of resources and need, the more predictable the results, and so on. And since all terminal managers schedule manpower and physical

A steady workflow uses resources more efficiently.

assets based on scheduled train arrivals, all field managers share both the responsibility and the resulting benefits.

As described in Part 1, a steady workflow also has a positive effect on safety. When work pours in, outstripping available resources, safety can be compromised as everyone scrambles to keep up.

There's a powerful upward spiral in getting the synchronization right. Greater road-schedule integrity builds greater trust that incoming trains will arrive on time. Terminal managers can then schedule people and equipment to better match the ebb-and-flow of trains. Better matching of people and equipment leads to safer and more efficient yard operation. Dwell time and yard congestion decline, while effective yard capacity expands. Operating expenses go down as both idle time and overtime are reduced.

Relevant Measures

It's all well and good to have a set of design principles for building a service plan, but unless you can measure the results, how are you ever going to know if you are achieving your objectives? What it comes down to is that you can't change what you can't measure. Moreover, you have to measure the right things the right way. In the following section we'll look at the methods we use to measure how well the railroad is performing.

To improve performance,
you have to measure
the right things the right
way.

A Balanced Approach

There's that word again: balance. Here's another word – synergy – which means that the whole is greater than the sum of its parts. That overarching principle runs through almost everything we do, particularly service design. Just as we have to look at the entire railroad network when trying to find a solution to an operating problem, so do we have to look at all the service design principles when fine tuning any one of them. Focusing on any single design principle inevitably leads to an imbalance of the Service Plan as a whole.

Optimization of the Service Plan requires we fine tune each principle subject to every other principle. One of the ways we

monitor the process is by applying yardsticks to key elements of the operation. Of the several key measures discussed in Part 3, let's return for a closer look at a few that really matter to the Service Plan.

- Car velocity
- Trip plan compliance
- On-time train performance
- Locomotive productivity
- Labor productivity

Missing from the list are financial yardsticks, such as revenues, free cash flow, and earnings per share. That's because financial results flow out of operating results, not the other way around. First, we commit to meeting the customer's service requirements. Then we operate to meet that commitment in the most efficient manner possible. If we do that right, the financial results follow.

Also missing are two measures, one operational, the other financial, that are norms for the railroad industry: trainload and revenue growth. We explain why below.

The Wrong Way

If trainload and revenue growth are industry standards, why didn't we include them in the list? Because, while they are both perfectly good measures, for us they focus on the wrong things.

- **Revenue growth** is a common financial measure. Industry analysts like revenue, as do we, but as we said above, we treat it as a consequence rather than an objective. Tell Marketing people to maximize revenue – and tie their paychecks to it – and Wall Street analysts will drool over amazing “top line growth.” Meanwhile, bankers will gaze in horror at a deteriorating bottom line compromised by the operating expenses incurred to fulfill the unrealistic promises luring the revenue.
- **Trainload** (the ratio of trailing gross ton miles to train miles) is a common operating measure. If you tell Operations people to maximize trainload – and tie their paychecks to it – you'll get nearly 100% utilization of train capacity. Unfortunately, no train will leave a yard until enough cars have arrived to fill up every one of its horsepower-driven slots, the schedule, and the customer, be damned.

This is how railroads, including ours, operated in the not-too-distant past, which is why those two measures are not on our list. However, even when we do use our list, we must be careful not to lose the network perspective that keeps it all in balance.

The Right Way

The problem often lies not in the measurement itself, but in its application. You have to be careful not to focus too tightly on individual parts of the system. A balanced “wide-angle” perspective is critical.

Let’s briefly look at each of the measures on our list and the design principles to which they are relevant.

- ▶ **Car velocity** – the number of miles a car travels in a day – is a measure of how efficiently a car is being used. Keep it moving through its cycle of empty-load-empty, it’s working for us. Let it sit idle in yards, loaded or empty, it’s not. That’s why a high relative value is placed on this measure, because it drives the entire productivity cycle of the railroad. The Service Design principles that focus on car velocity are minimizing car dwell time, minimizing car classifications, and using multiple traffic outlets.
- ▶ **Trip plan compliance** is a measure of how well we meet our on-time commitment to our customers. If we consistently deliver on time, customers are happy, and willing to pay a premium price for a premium service. If we’re habitually late, though, customers are going to re-think their options. The Service Design principles behind trip plan compliance are minimizing car dwell time, minimizing car classifications, and using multiple traffic outlets.
- ▶ **On-time train performance**, as we mentioned above, is an important measure, but we don’t want it eclipsing other measures that are equally or more important from a network perspective. The Service Design principles that contribute to on-time train performance are using multiple traffic outlets, running general-purpose trains, and striving for steady workload flow.

- ▶ **Locomotive productivity.** Like cars, we want as few locomotives as possible, but those we have, we want working all the time, not sitting idle in a yard or being deadheaded. The Service Design principles that support locomotive productivity are minimizing power requirements, running general-purpose trains, and balancing train movements by direction.
- ▶ **Labor productivity.** Labor is by far our greatest operating expense. We closely monitor productivity to ensure that we're getting the best value from our payroll. The Service Design principles that impact labor productivity are minimizing car classifications, balancing train movements by direction, and striving for steady workload flow.

However you measure how well you're doing, you have to measure it the right way. If the standards you use are too low, you may make your performance look better than it really is. For example, a competing railroad recently claimed that its trip plan compliance performance was better than ours, even though we were providing better service to our customers as a result of reduced transit times. The difference was, we were holding ourselves to higher standards.

The Bottom Line

At this point you might ask, does this seeming obsession with operating performance and productivity translate into something tangible, such as profits? Yes, it does. Financial results flow from operating results. In other words, the more efficient the operation, the better the bottom line. One caveat, however, is that while performance gains tend to show up relatively quickly, the financial benefits will only show up later. But they do show up and, more to the point, they do add up.

Let's take a look at a little recent history.

The table below is a "snapshot" of CN's operating and financial performance for the five-year period between 1999 (the year we began using these measures) and 2004 (the last year for which we have complete data at the time of writing). The table shows the five key operating measures discussed above – car velocity, trip plan compliance, on-time train performance, locomotive productivity, and labor productivity – and how the railway's operating ratio

(operating costs to revenues) went down as both revenues and operating efficiency went up.

The operating ratio shows how much it cost to make one dollar of revenue. As you can see, it cost 75.1 cents in 1999 to earn a dollar, whereas it cost only 66.9 cents in 2004. Although during the same period, revenues increased, even if revenues had remained static, operational efficiencies alone would have resulted in a decrease in the operating ratio.

| Measure | 1999* | 2004 |
|---|---------|---------|
| Car velocity (car miles/day) | 133 | 168 |
| Trip plan compliance (carload) | 81% | 85% |
| On-time train performance | 77% | 81% |
| Locomotive productivity (GTM/HP) | 232 | 281 |
| Labor productivity (million GTM/E) | 11.7 | 15 |
| Revenues (Cdn\$ million) | \$5,236 | \$6,548 |
| Operating ratio (adjusted) | 75.1 | 66.9 |
| * Does not include Illinois Central or Wisconsin Central. | | |

Obviously, we're doing something right by focusing on reducing operating costs and increasing productivity. And as we continue to make CN a more customer focused, efficient, safe, and socially responsible company, things can only get better.

"CN is one of the few railroads in our experience that has been so effectively able to translate volume growth and take it to the bottom line via operating leverage," said Smith Barney analyst Scott Flower.

CN Profits Hit Record, Traffic World, 2004

Managing the Process

While it's important to measure results, we also have to give appropriate weight to the various components of the Service Plan. How do we manage the process to ensure we get it right?

"Being on the tightrope is living; everything else is waiting."

Karl Wellenda
(1905 - 1978), of the
Flying Wellendas

Here are the basic guidelines:

- **Build control directly into the process.** In our field/network alliance, control is indistinguishable from the process itself, and real-time problem solving combines the field managers' local expertise with the general superintendents' network knowledge. Centralized design and decentralized execution encourages both parties to lobby their respective positions, promotes "doing the right thing" for the network, and results in practical, timely solutions based on fact. However, it only works if field managers pick up the phone to report a system problem, and if someone answers.
- **Balance opposing controls against one another.** Consider the dilemma we described earlier, "Get the train out on time or hold for power?" Our answer was, "Whatever's best for the network." By making one person responsible and accountable for both on-time train performance and power flow, the balance is built into the decision-making process. If these two objectives were split between two people, it could lead to conflict, with perhaps neither objective being met. If you're responsible for both, you quickly become adept at collaborating with equally motivated colleagues in assessing the trade-offs.
- **Communicate objectives and results.** In railroading, there's no shortage of information upon which to base decisions. In fact, there's often too much. Therefore, we must carefully weigh and test all key measures for which employees will be held accountable. And we must make sure we're all marching to the same drum. Shared goals ensure that we look at a problem in terms of our own agendas and skills, but are aware that our part is only as good as the whole. But if we're shot down for speaking up, we stop sharing our concerns, stop sharing what we see from our unique perspectives, stop sharing the early alerts that every healthy organization needs.

Pushing the Envelope

Running a railroad isn't quite as risky as being an aerialist perhaps, but there are risks in any endeavor. Take car-trip plan compliance. On

the one hand, we don't want to disappoint our customers – fail to do what we said we'd do – so we're tempted to play it safe and pad out the expected transit time. On the other hand, longer transit times only confirm what customers already believe, that rail is too slow. Playing it safe backfires on us.

If we're too aggressive, we risk failure. But if we're too cautious, we'll never get any better. It isn't enough to be 100% reliable on so-so service, good at being just okay. We need to keep pushing the envelope, then stop just short of pushing too hard.

If it seems like the company is expecting a lot from its employees, you're right, it is. But as former U.S. Navy Captain Mike Abrashoff says in his book, *It's Your Ship*, "You can't order an outstanding performance. You have to plan, enable, nurture, and focus



on it." And, as we pointed out in the People section of Part 1, that's exactly CN's approach.

To paraphrase a popular song lyric, CN's operating prowess today is better than it was yesterday, but not as good as it will be tomorrow. Continuous improvement is based on a series of small successes on many fronts – "base hits." With each success we gain a little more confidence, set our goals a little higher, reach a little further, until constantly striving for improvement becomes standard operating procedure.

Part 5

Upward/Downward Spirals

Introduction

You've read a lot in the preceding chapters about how important it is to "do the right thing," to base your operating decisions on what's good for the overall network rather than your immediate part of it. And we've alluded to the positive consequences of doing the right things, how each incremental improvement, no matter how small, makes it possible to achieve things that would have been otherwise unachievable, which in turn makes other heretofore unattainable goals attainable.

If doing the right thing has positive consequences, it stands to reason, then, that *not* doing the right thing – or worse, doing the *wrong* thing (there *is* a difference) – has negative consequences, resulting in a downward spiral of failure following failure, the situation worsening each time, until it becomes an uncontrollable plunge into disaster.

The purpose of CN's guiding principles, particularly Service, Cost Control, and Asset Utilization, as well as the Service Plan, is to make sure that we know what the right things are, what's expected of us, and what we can expect in return. Later in this chapter we'll look at the positive consequences of following the Service Plan and doing the right thing. First, however, we'll take a brief look at what happens when we don't do the right things, when we don't follow the Service Plan – or, worse, when we don't have a plan at all.

The Downward Spiral

Where It Starts

The downward spiral can begin anywhere, with any division or department that fails to do the right thing; however, since the railroad would not exist without its customers, let's start at the beginning of the car cycle, with the late delivery of empty cars to the customers.

When a railroad is chronically late delivering empties, customers may demand a back-up supply of cars to meet their loading requirements. This forces the railroad to borrow money to buy or lease additional cars. More cars means more handling as cars are moved in

and out of storage tracks, to and from customers. Both operating and capital expenses rise. With more cars on the network, customers need longer sidings or terminals need storage tracks, which increases both the customers' costs and the railroad's.

As costs rise the railroad implements cutbacks across all departments, including Mechanical, compromising its ability to properly maintain rolling stock, particularly locomotives. Breakdowns contribute to even more service failures, further alienating customers and increasing operating costs. Moreover, as a result of Mechanical's failure to meet Transportation's need for reliable locomotives, to prevent further deterioration of service, the railroad acquires additional locomotives as insurance against breakdowns. More locomotives, however, means more maintenance, which increases the pressure on Mechanical, further compromising its capabilities. To handle the increased maintenance workload, the railroad must build additional facilities and hire more personnel, further driving up capital and operating expenses.

Where It's Going

It's clear where our fictional railroad is headed – straight for disaster.

Dissatisfied customers lobby Marketing for reduced rates or other preferential treatment. Anxious to retain revenue, Marketing cuts special deals and makes promises Operations can't keep. As the railroad engages in departmental in-fighting, service continues to deteriorate and customers become even more disenchanted.

Operations is forced to run special trains for customers. Dead-heading locomotives and crews squanders locomotive productivity and incurs accommodation, meal, and overtime expense. Because trains don't run to schedule, arrival and departure times become unpredictable and work flow erratic. Lulls waste labor productivity while surges compromise safety and drive up overtime. Increasing numbers of accidents further erode morale, productivity, and reliability, and push up costs.

Where It Ends

As expenses approach the level of revenues, the railroad can't afford to cut any more deals with customers. When cash flow can

no longer cover interest on loans, banks downgrade the road's debt rating, making it more expensive to borrow money. Unable to raise capital, the railroad is forced to let its infrastructure deteriorate. Derailments occur as a result of poorly maintained track. Trains are delayed while the railroad pays Engineering overtime to get the track back in service. Customers cancel their contracts in favor of a trucking company that can deliver on time.

Investors lose confidence and start to sell off shares. Unable to raise capital through share issues, the company must turn to the banks, but because the company is seen as a poor risk, the cost of borrowing is high.

Railroad morale sinks, good people leave, and it becomes even more difficult to deliver empty cars on time to those customers – if any – that have stuck it out (some, unhappily captive, may have no alternative).

This grim scenario illustrates the potentially destructive effects on service, operating performance, finance, and the morale of employees of failing to do the right thing. It started with a common operating problem and spiraled out of control because nobody fixed it when they had the chance.

Consequences of Service Failure on Customers

In the above scenario we see what happens to the railroad as a result of that downward spiral. It's even worse from our customers' perspectives, because their business depends on our service.

If we fail our customers, they fail their customers. For example, we move a huge volume of packages for major courier companies. If we don't do what we say we'll do, our customer may not get paid, because in the courier business it's often "on time or free." A customer in a time-sensitive business like this cannot risk late deliveries. They'll take their business elsewhere.

Many of our customers are big retail stores. Their customers are ordinary people, like you, your neighbors, or your friends. If products don't arrive on time to fill the shelves, you will go somewhere else. The store loses not only that sale, but possibly your future business as well, because a dissatisfied customer doesn't come back. When we fail to deliver to the customer in the retail or the

wholesale business, the effects ripple outward, destructive to the customer and eventually to us.

A failure to deliver when we said, in good condition, costs our customer and our customers' customers. That's bad business, because our customer's sales manager must apologize to customers for failing to deliver the order on time. The transportation manager, who made the decision to use rail, might demand lower rates to offset the higher operating expenses they incur as a result of doing business with us, or stop using rail altogether.

Consequences of Service Failure on our People

When service fails dramatically, it also has serious consequences within our own ranks. Employees make jokes about a lack of planning. For field managers in traditional railroading, "managing the exceptions" is a laughable concept when every day is an exception. The field's view is that the Service Plan is created by people drinking cappuccino in comfortable offices, who don't understand what it's really like on the ground. This can result in an internal "us versus them" attitude (which should be reserved for external competition), with operating managers rolling their eyes and denouncing the plan among themselves. The failure of the plan can also become a handy excuse for poor operating managers to cover up, divert attention, and explain away their own avoidable service failures.

The Upward Spiral

The Fork in the Road

There's an old saying that goes: "When faced with a choice between two courses of action, the right one is usually the hardest." Taking the easy route might produce some short-term benefit, but in the long run, as the preceding section illustrates, it can lead to disaster. Doing the right thing results in an upward spiral of benefits that accrue to different stakeholders at different times. By doing the right things, we can go from good to great, where opportunities previously out of reach suddenly become feasible when a higher level of precision is sustained.

We began our illustration of the downward spiral with customer service, which is the ultimate aim of the Service Plan. The success or

"[...] and I-
I took the one less
traveled by,
And that has made
all the difference."

Robert Frost

failure of customer service depends on a lot of people or departments making the right choices. Let's begin our illustration of the upward spiral with one of those choices, where the right decision leads ultimately to improved customer service.

What if...

When Mechanical does the right thing and supports the Service Plan with better preventive maintenance and greater locomotive reliability:

- Transportation can reduce the amount of backup power it has to add to trains as a hedge against breakdowns. This allows them to reduce the locomotive fleet and retire older equipment, which lowers operating and maintenance costs.
- With a smaller, more modern fleet, Mechanical can focus its energies on improving preventive maintenance, further increasing locomotive reliability, allowing Transportation to improve locomotive productivity even more.
- With more reliable power, train schedules are more reliable. With more predictable arrival and departure times, terminal managers can schedule people and equipment to match the workflow, which leads to a safer, more efficient yard operation. Operating expenses, car dwell time, and yard congestion drop.
- With more reliable train schedules and increased yard efficiency, customer service improves. Empties are delivered on time, loads are picked up promptly, and the customers' goods are delivered to their customers on time.

When Transportation does the right thing and supports the Service Plan with improved terminal and local switching performance so cars are always available as per schedule:

- Car managers can schedule cars more tightly with their commitments to customers, improving turn-times and increasing car fleet productivity.
- With a more reliable supply of cars, customers can release their backup inventory, relieving congestion on their sidings and further increasing car fleet capacity.
- Greater car productivity allows the railroad to reduce the car fleet, lowering maintenance and asset ownership costs and

freeing up track previously used for storage, relieving yard congestion and effectively increasing yard capacity.

- ▶ Reduced need for storage track lowers maintenance costs and allows Engineering to focus its energies on improving maintenance of a smaller physical plant.
- ▶ Reduced yard congestion and a more reliable physical plant improves yard operations and customer service.

When Engineering does the right thing and supports the Service Plan by bringing track back up to standard and removing temporary slow orders as soon as possible, fuel consumption is reduced, locomotive productivity improves, as does on-time train performance, which improves customer service.

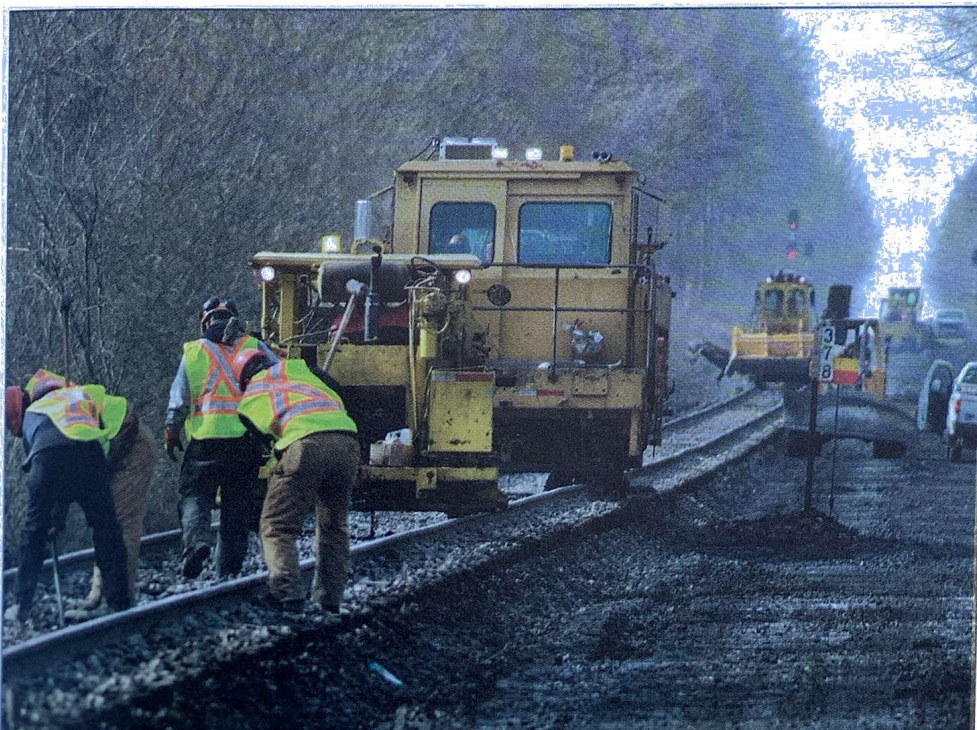
When Mechanical turns bad-order cars within 24 hours, car velocity increases.

When Transportation runs so tightly to schedule that opposing trains can be synchronized to meet at specified terminals, crews can swap trains and return home in “turnaround service.” Crew and locomotive productivity go up, and away-from-home expenses go down.

And so it goes, an ever-increasing upward spiral of improvement following improvement, each contributing to ever better customer service and a better operating ratio.

“The truth of the matter is that you always know the right thing to do. The hard part is doing it.”

General H. Norman
Schwarzkopf, *Ret.*,
U.S. Army



So far we've focused on Operations, but Marketing and Finance also contribute to the upward spiral.

Marketing supports the plan by unbundling services so that customers pay only for the services they need. Transportation can then offer specific suggestions on how customers can avoid extra expenses by modifying certain plant or dock procedures.

Supply Management supports the plan by disposing of excess rolling stock, turning back leased equipment to end lease payments or selling owned equipment, and Finance uses the cash to pay down debt to lower interest expense.

Not only the railroad and its customers benefit. With the support of its customers, the precision railroad uses its leverage with other carriers to improve interchange points, by creating shared objectives through a workable system of incentives and penalties. Everybody benefits.

Stories from the Field

Locomotive Fleet Integrity

Here, Jim Danielwicz of Network Operations explains the Mechanical department's commitment to the Service Plan.



VOICES

Jim Danielwicz
Edmonton,
Alberta

The folks in the Transportation department are Mechanical's customers. And every day we make commitments to them. Scheduled railroading depends on the integrity of our locomotive fleet.

Since we're supporting a 24/7 operation, our shops also have to be 24/7. Each day, shop personnel set their plan for the next 24 hours, which includes a projected release time for each piece of equipment.

Transportation takes us at our word. They schedule the equipment back into service based on the projected release time we give them, and they trust that the work will get done right the first time, so they don't have a failure out on the road somewhere.

Projected release times are Mechanical's version of car trip plans. And just like terminal managers who study their trip-plan failure reports looking for patterns to improve their operation, we get daily F7 reports that indicate a repeat failure within seven days of a shop visit. No piece of equipment should give a train crew trouble when it

was in the shop within the last week! Shop management is responsible for investigating and fixing the root causes of repeat failures.

Fleet integrity also depends on the quality of the materials we use. We depend on the integrity of suppliers who stand behind the quality and precision of their parts. Suppliers must be willing to partner with us in root-cause analysis of any failure. They must share our sense of urgency.

Consequences of Service Success for Customers

To survive, let alone prosper, the rail industry must adapt to customers' needs or be left behind and further marginalized. The basic principles of precision railroading and supply chain management are essentially the same: *deliver it when and where it's needed, no more, no less, no sooner, no later.*

We are accountable for optimizing the assets entrusted to our care. And just as we saw that there are negative consequences of a downward spiral in service, so too are there positive consequences of an upward spiral.

When we do what we say we'll do – ensure that our customers have the cars they need when they need them, pick up and drop off shipments when we said we would – our customers can pass these efficiencies on to their own customers. By providing reliable, trustworthy service, day-in and day-out, our customers can reduce or eliminate the extra time or cars they build into their operation as a safety margin. A consequence of this better use of assets is increased car velocity and reduced operating costs, for both us and our customers.

By being better ourselves at what we do, we are helping our customers be better at what they do. Our customers reward us with more business and we gain market share. Moreover, we are able to charge a premium price for our service, because it's worth it.

Consequences of Service Success for our People

Although traditional railroad practices encourages local "selfish" behavior, precision railroading rewards behaviors that benefit the network. Teamwork is the name of this game. All employees are

focused on shared objectives. Managers and work units distinguish themselves in their support of the overall network.

The more predictable the operation, the more managers can focus on planning workload, thus restoring people's work/life balance, enhancing safety, communicating with employees, providing feedback and mentoring. Predictability gives managers breathing room to get out from behind their desks/computers/telephones and spend time with their employees.

The major benefit of precision railroading is that it allows everyone, from field managers to vice-presidents, to shift their gaze away from the rear-view mirror where the legacy of traditional railroading looms larger than it should, and to the future.

Stories from the Field

Just So We Understand Each Other

Shifting our gaze from the rear-view mirror is something all employees need to do, from vice-presidents to track foremen to pin pullers. Some people don't get it however.

I am very proud of the many examples in this book of great employees demonstrating and living our five principles. Each of them is a great railroader in their own right. These people "get it" and are a credit to this company, their families and themselves.

Yet, sadly, I must tell you, there are still some small pockets that do not or refuse to get it. There are two examples I will share with you that show that there is still some work to do before we can all be confident that there are no members of the CN family pulling us down.

The first incident happened in one of our yards.

I spend a lot of time out on the property because that's where the action is in the railway. On one of my tours, I was in a tower observing the flow of cars through the yard with the local management. It became apparent quickly that one of the pin pullers was less than committed to his job. He was proceeding at a very slow pace and this was significantly affecting yard productivity, but no one was acting on it.



VOICES

E. Hunter Harrison
Montreal, Quebec

I believe in leading by example, so I came down from the tower to have a face-to-face conversation with this gentleman. I asked him if this was the best he could do. Let me tell you he was shocked. I then explained to him the critical importance of what he was doing for the yard, the system and ultimately the customer and that he had to change. He told me he had been working for the railroad for over 25 years and no one had ever told him how important what he was doing was or that he might not be doing all that was expected. He was shook up.

But the next day he was working like someone who was committed to doing a good job. He made the change.

That's all we ask. So make sure you understand where you fit in and what is important. If you lead people, let them know what is expected and, as importantly, why.

The second story took place in Vancouver and has attained a near legend status in the company in a very short time. I will give you the true version – shortened only a bit so that it will fit.

I had just checked into my room at the Pan Pacific, a nice hotel in downtown Vancouver. I was there to spend three days talking with employees from around the company in what has come to be called a "Hunter Camp." I was working at the office desk in the room checking my e-mails and using the various CN systems to check on the operational performance of the company. To my surprise there was a pair of binoculars on the desk. Now this is something I had never seen in a hotel before. I understand now that they had been placed there so that the guests could use them to enjoy the view of the spectacular mountains and English Bay below.

As I looked over the city I noticed one of our yards – VanTerm – the Vancouver terminal. I noticed one of our locomotives sitting idling in a corner of the yard. I didn't give it much more thought. I conducted more business and prepared for the session ahead.

About 30 minutes later I looked and the train had not moved. I went back to work. Ten minutes later, I checked again and the train had still not moved.

Now I was really engaged!

I attempted to call the local yard but could not reach anyone. I called the NOC (Network Operations Centre) and asked,

“Why isn’t 5867 moving?”⁴

“Sir?” they replied.

“I am looking at 5867 and it’s not moving. What is it supposed to be doing?”

Well they were in a major state of shock. No one could figure out how I could see this assignment. They hurriedly tracked down some people at Vancouver and I watched as a crew finally made its way out to the engine and commenced working – at a very leisurely pace.

I made a few more calls and got the local and regional management as engaged as I was. Jets were turned around. Meetings rescheduled. Why? Not because I want to micro-manage Vancouver but because we had a real problem of culture with a few employees.

After looking into the issue, they found that the crew had been taking a 50+ minute lunch where the contract they had negotiated allowed for 20 minutes. When they did work, it was at the minimum level of effort.

There were multiple problems here. First some of the local supervision had let down CN supervisors everywhere by not managing in a consistent manner with what other managers were doing. They were also letting this crew do the wrong thing.

When local management took up the issues with the employees of that train, the crew gave the message: “We used to leave early. Now we stay the full day. What else do you want from us?”

What else do we want?

You are probably as amazed as I was. I just can’t imagine what goes on in their personal lives. If they hired someone to paint their house and the person sat around and didn’t paint but expected to get paid at the end of the day – would they pay them? We know they wouldn’t. I wouldn’t, you wouldn’t. We know it’s unacceptable. So why do they think it is different once they walk under the CN sign?

How did it get this way?

We let it slip, as we let our standards slide, little by little over

⁴ Engine number changed to shield the guilty.

time; when the leaving five minutes early became the early quits of three hours; when it became acceptable to not give good effort. The culture got sick as some people forgot that the behavior they would expect at home and in their personal lives was what we expected here. That can't last.

An integrated team like CN means that we are like Olympic rowers. We all need to pull. It does not work if seven of eight people are trying and it is not fair to the rest of us.

The choice is absolutely clear. The companies that don't address these issues suffer terrible consequences. These impact the employees, their families, the shareholders and the communities these companies operate in. All this because a few employees thought it was right to do the wrong thing. It starts a rust, a rot that slowly takes over if we don't deal with it.

Attitude and performance like this mean others have to work harder so that we don't fall behind our competitors and that we still **"do what we say we will"** for our customers.

Great teams don't allow people who don't want to really play to stay. It has to be the same with us.

So we have to convert these people or cut them. To be fair, we have to be very, very clear of the negative consequences of their unwillingness to give good efforts.

If after all this, they refuse to pull with us, they can't work for us. We must protect the livelihood of those who do care. I can't let these few damage it for us all. I will not let this happen on my watch.

These people have a choice. They can pull with the rest of us or they can leave. There is no third option.



Part 6

Where We Go From Here

Leading Edge Railroading

We're all familiar with the notion of an idea whose time has come. It ceases to be an abstract concept, a "pie-in-the-sky" fantasy, and evolves into something real, something tangible. In this final chapter, we'll show you how we're building on the successes of the upward spiral to take the idea of the precision railroad to an even higher level.

For some of the ideas you'll read about, the time is now. For others, the time is a little further into the future. What they all have in common, however, is that they push the envelope, taking the precision railroad to the next logical step in its evolution.

But we're not just setting a higher standard of operation for ourselves, creating a new cycle in the upward spiral. We're saying to all North American railways, "If we work together, if we work *smart*, we can get back a large part of the traffic lost to trucking in the last several decades."



The Reality of Merchandise Railroading

Whether you call it loose car, merchandise, or small-lot, the carload business began a steady decline in the second half of the last century, lost to trucking. For obvious reasons, though, truckers haven't made a dent in rail's share of bulk markets. Rail is the king of bulk traffic, and "hook-and-haul" bulk is a railroader's dream. But most of the world's freight comes by the carload, not the trainload, as evidenced by the fact that trucking's share of freight is nine times larger than rail's. If railroads want to be serious players again, and regain a significant share of this business, they must face the carload challenge.

There's a strange ambivalence among Class 1 railroads toward merchandise railroading, which is more variable and requires more handling and is therefore harder to do. Some railroads worry about the trend, but many seem resigned to let carload business slide away. Their philosophy seems to be, "Milk it while it lasts but concentrate on rail's dominance in moving trainloads of grain, coal, containers, and mini-vans." But this is a losing proposition.

Consider the failure of once-grand British Rail. As a matter of government policy, BR management actively discouraged carload customers. Despite its monopoly, BR's overemphasis on hook-and-haul drove down its share of freight from 20% to 6-7% in little more than a decade – a story of spectacular failure and a squandering of rail's socioeconomic value.

CN sees a future in carload. Of North America's Class 1 railroads, CN is the carload leader. That means we have the most to gain (or lose) with every shift of market share between truck and rail. That also means we have a huge stake in learning how to maximize the yield from our existing operation – a win/win situation for both our shareholders and our customers.

Costing

The two most important factors of running any business are (1) how much it costs to provide your service, and (2) how much your customer is willing to pay for that service. If it costs you more to provide a service than your customers are willing to pay for it, it doesn't matter how many customers you have, you aren't going to

stay in business long. Therefore, in order to determine whether it's worth your while to provide that service, it's important that the methodology – the costing model – you use to determine your costs is solid.

Any traffic moving on CN's network generates immediate operating expenses, mainly fuel and crew wages. There are also a number of long-term costs that must be included, such as purchasing or leasing locomotives and cars, maintaining them, as well as track maintenance and renewal. These combined operating expenses and long-term costs, which vary with the volume of traffic, are referred to as *long-term variable costs*, or LTVC. As we mentioned in Part 3 (see *Revenue-to-Cost Ratio*) net revenue must exceed long-term variable costs by a comfortable margin in order to contribute to fixed costs.

As we've mentioned previously, too, CN's "product" is train capacity, or car slots. To maximize revenue from a train, we do our best to fill all its available slots. We don't always succeed, however, and a train may depart with unused capacity. When we weigh the costs of filling unused slots against the additional revenue we could earn from them, we're using an incremental costing approach, or ICA.

Consider a scheduled train whose capacity is 100 cars, but runs on average with 90 cars of traffic. What if we fill out the train with 10 more cars? What incremental costs will we incur? Some costs will not increase: crew wages and locomotive costs, for example. However, switching 10 more cars at origin and destination will incur additional yard engine/crew costs. Also, adding 10 cars will increase the train weight and fuel consumption. Naturally, the additional revenue should exceed those incremental costs, otherwise it isn't worth it to fill the unused slots.

Although the incremental costing approach seems like a no-brainer for every train running at less than capacity, there's more to it than meets the eye. For example, with the exception of intermodal and bulk services, most traffic moves on several trains between origin and destination; therefore, before we fill empty slots on today's train, we have to be sure there will be space available on all connecting trains.

The incremental costing approach makes sense on low-density corridors, where there is a minimal amount of traffic. It is also used to evaluate one-time “spot” moves. However, even when incremental costing appears to make economic sense, we need to avoid long-term contracts; if traffic patterns change we might find ourselves in a situation where incremental traffic uses capacity preferred for higher revenue generating services. And if CN cars are used, there may be a shortage of cars for higher revenue service.

The truth of the matter is, traffic that doesn’t cover the full LTVC puts CN’s future viability at risk. On the other hand, if we use the LTVC model exclusively, we risk turning away revenue opportunities. The best protection against this is to maintain focus on underutilized assets. Operations and Marketing people must share an objective to minimize unused slots.

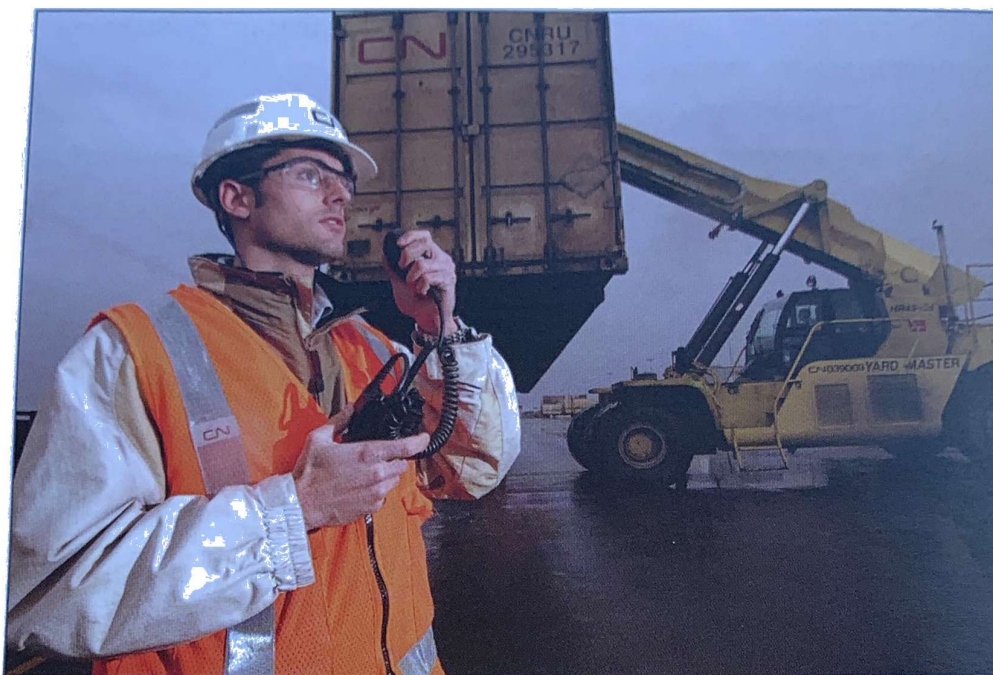
The magic is in the mix, and the “mix” itself is controlled by a process called yield management, which seeks to use assets as fully as possible for maximum revenue and profit.

Yield Management

Yield management, also known as revenue management, is a methodology for increasing revenues and improving customer service by responding to current and expected demand for that service, and determining what the customer is prepared to pay. The airline industry has been using sophisticated and powerful yield management techniques since the 1970s to model and optimize bookings, its complex system of interconnections, and its incredibly convoluted fare structure.

Like the airline industry, rail has a complex web of interconnections, a complicated fare structure, and if you think of the slots available on a train as seats on an aircraft, it’s easy to see how yield management techniques might also be applied to running a railroad.

For example, intermodal demand is heavily skewed by day of week, with 3% of the total demand on Sunday and 22% on Friday. In other words, there are a lot more unused slots on Sunday than on Friday. However, if volume was spread evenly throughout the week, about 15% of the total would show up each day. Here was



a perfect opportunity to apply an incremental costing approach in order to smooth out the demand and better utilize our assets.

Which is exactly what we did.

In 2003, CN introduced a concept called IMX (Intermodal Excellence). IMX gives our intermodal customers incentive to ship their goods on low volume days by offering day-of-week pricing, and slot reservations similar to airlines and hotels. By the end of 2004, IMX was producing substantial improvements in train productivity and the revenue-cost-ratio.

Naturally, we quickly realized that we could apply the same principles to the carload business. By applying the principles of IMX to car allocation and pricing – call it CX, Carload Excellence – we spread out demand, filling unused slots on slow days, thus reducing car dwell time by getting cars through the yard faster, improving car velocity and reducing yard congestion. At the same time, we are offering customers *value*. It all comes down to improving processes to control costs and get the most out of our assets.

We have to be careful, though. The airlines, with their sophisticated computer systems, became adept at analyzing demand for each individual seat on each plane, and pricing accordingly. However, they became so enamored of their technological prowess

that they lost their sense of balance. Their customers stopped seeing thoughtful, responsible asset utilization and began to feel they were being gouged.

We have a long way to go before we become sophisticated yield managers. Along the way we have to maintain a healthy, balanced perspective. Creative uses of differential pricing, aimed at leveling workloads and finding customers for otherwise-unused slots, support our never-ending quest to manage costs and assets. Success will happen when customers believe there's something in it for them, that they get real value in exchange for changing their business practices and processes.

Terminal Efficiency

Obviously, a key element of overall railroad productivity is terminal efficiency. In our carload business, we've seen significant gains in yard productivity and car velocity as a result of the blocking plan and the focus on tight connections. In part, IMX applies what we've learned from our carload business to intermodal terminal operations.

If we let them, intermodal terminals tend to become warehouses for customers who are not ready to receive their shipments. But we're a transportation company, not a storage company. Just like in our rail yards, letting containers stack up in the terminal is poor asset utilization. If we are to get the most out of our intermodal assets (yards, containers, chassis, trucks, staff, etc.), and provide our customers with good service value, we need to keep container traffic moving, from trucks (or ships) to rail and from rail to trucks (or ships). Once you let a container "touch the ground," you've doubled your handling costs.

To keep containers off the ground and moving, we have to work with our customers to schedule truck arrivals and train departures with precision. For those who need warehousing, we can build an efficient facility to handle that. We've got a lot of work to do to achieve our goals, but the benefits are well worth the effort.

Although we've made many productivity gains in the operation of our rail yards, there is still room for improvement there too. The "SmartYard" concept is to yards what general purpose trains is to train operation. It is a way of increasing yard capacity without adding a single track.

Smart Yard consists of three main components:

Dynamic Class Track Assignment. Smart Yard sees classification tracks as overall yard capacity rather than as individual tracks for blocking specific trains. Recognizing daily fluctuations in traffic, Smart Yard allocates class track capacity dynamically to match the volume and mix of traffic.

Dynamic Blocking. Daily fluctuations in the volume and mix of traffic also provide opportunities for an originating yard to dynamically adjust its blocking plan. Small blocks can be assembled into larger ones, or large blocks can be sub-divided into smaller ones. The objective is to sort traffic in the most efficient way. One day a terminal may do more blocking, other days less, but overall, blocking is optimized.

Empty Car Distribution. Empty cars represent a significant amount of traffic. Unlike loads, however, we control where many of the individual empty cars go. Smart Yard takes advantage of this latitude, assigning the destination to each car just before classification. Destinations are chosen to meet car orders, maximize car velocity, and to improve terminal efficiency.

Smart Yard is not just about one yard. When you link all the Smart Yards together, then you will be applying the concepts consistently across the network. Smart Yard is not just about efficiency. It's about business and the bottom line. Smart Yard allows you to do more with what you have. By changing how we work, we can increase network capacity with the existing facilities. By changing the way we manage the business and work with our customers, we can better use the assets we have.

Stories from the Field

Delivering Freight or Delivering Value?

Delivering value to customers is what business is all about. Not every business delivers value in the same way, and any particular combination of price, quality, reliability and convenience will appeal to some, but not all, customers. Here's Peter Marshall with his views on making the right strategic choices.



VOICES

Peter Marshall
Edmonton,
Alberta



Too many businesses squander their resources by spreading them too thin, dabbling in too many areas, diffusing and diluting their

focus, which only produces average results – everything gets a little bit better. A business that doesn't have an absolute, disciplined focus on its value proposition will always fall short of its intended performance goals.

In any field of endeavor, many are “very good.” Only a few are “outstanding.” To achieve true distinction – to rise above customer expectations and maintain a leading edge as an outstanding performer – we need a passionate and disciplined focus on our value proposition and on the resources that deliver this to our customers.

Paul Tellier warned us against becoming complacent. CN's risk is that we'll become content to just keep tweaking what we're already doing rather than concentrating on the next breakthrough. Author Jim Collins says, “The purpose of budgeting in a good-to-great company is not to decide how much each activity gets, but to decide which arenas...should be fully funded and which should not be funded at all.”

Or in the words of authors Michael Treacy and Fred Wiersema, “Not choosing means ending up in a muddle.” Their advice? “Narrow your focus.” Concentrate on three or four initiatives that are powerful enough to catapult the business to the next level of play. “The [average] operationally competent company will shy away from these tough calls – and pay the price.” The operationally excellent company has the courage to step up to the hard choices.



All Aboard

How Do We Get Other Railroads Onboard?

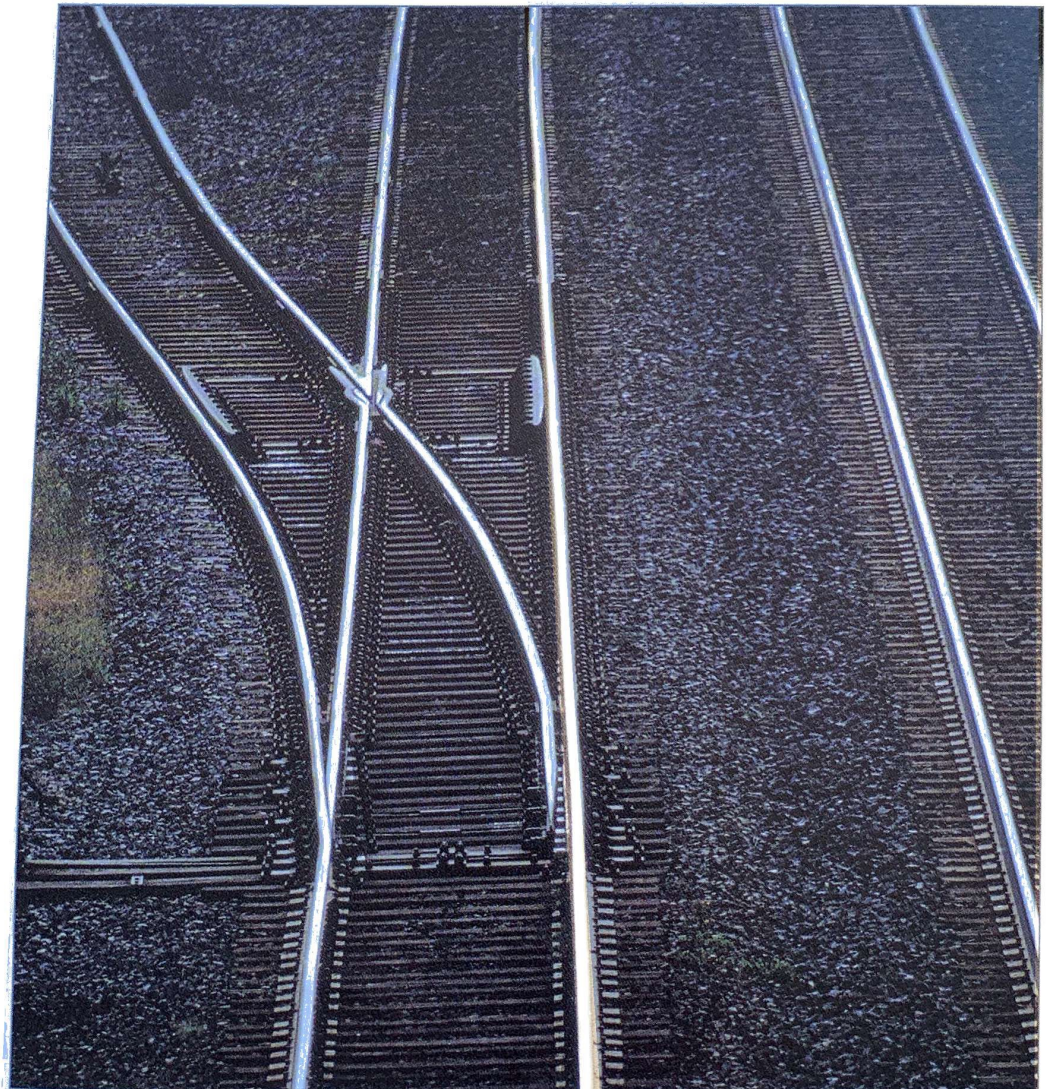
How do we get to the next level of play when our marketplace is constrained by the geographical limits of steel rail? How do we leverage the power of disciplined, scheduled railroading for the nearly 50% of CN carloads interchanged with other carriers? How do we make points of interchange more efficient for them and us? How does our industry get to the point where we can pledge on-time performance all the way from origin to final destination, across different carriers?

In other words, how do we get other railroads to look beyond narrowly defined market-share measures and focus on increasing rail's share of the freight transportation pie?

One answer is alliances.

Each railroad is a network unto itself, but each is also a part of a much larger interconnected and interdependent web that makes up the North American rail network. Paradoxically, our competitors are also our partners. Since it's unavoidable, how do we extract maximum benefit from being "joined at the hip" with other roads?

CN is already more serious and willing to consider joint ventures than other roads seem to be, but a number of factors impede leveraging our natural partnerships. Most fundamentally, there are differences in business priorities and strategies. However, there are also technical issues, such as differences in information systems, which make it difficult for railroads to "speak" to each



other and share information such as schedules, consist, and other customer-specific data.

Nor is it always easy to assess the overall benefits and costs of alliances. Time itself is a constraint, since there are already too few hours in the day, too many e-mails, voicemails, meetings, faxes, etc.

And finally, perhaps the most ingrained barrier is human nature, the tendency to stick with the familiar and comfortable, to keep doing things the way we've always done them, particularly when it comes to interchanges. Historically, to retain as much of the revenues for themselves as possible, railroads have tended to put off handing traffic over to another road, even though it would result in more efficient routing, less handling, and better customer service – not to mention improved asset utilization and cost control for the railroad itself.

When we talk about forming alliances with other railroads, we're not suggesting price-fixing or anti-trust. We're talking about each road working in its own best interests within the framework of the industry as a whole. Every load we collectively wrest away from truck increases the overall size of the rail pie. But we can't do it alone. We need to work together. There's too much at stake for us not to do all we can to enhance the movement of freight across the entire network.

It requires a major shift in the way we think about railroading – what is often called a *paradigm shift* – to see the combined resources of all North American railroads as a single, integrated network, working together. But this shift is occurring.

Here is a list of some of the agreements CN signed in late 2004 and early 2005 with other railroads:

- ▶ October 2004: with Canadian Pacific Railway, co-production agreements to improve rail operations and service for the Port of Vancouver freight traffic. The agreements increase combined capacity on key sections of track in the Vancouver area to improve the fluidity of rail operations over existing infrastructure and service for shippers using the port.
- ▶ November 2004: with Canadian Pacific Railway and Norfolk Southern Railway, an agreement to improve freight service

between eastern Canada and the eastern United States. The three-party arrangement will give CN and NSR a seamless, direct north-south routing over CPR's line south of Montreal, cutting as much as two days' transit time off some 20,000 annual shipments. It will also increase traffic density and revenues on CPR's wholly owned subsidiary, The Delaware and Hudson Railway.

- ▶ November 2004: with Canadian Pacific Railway, three network initiatives to improve customer service, increase track capacity, and maximize use of railway infrastructure.
 - A slot-sharing agreement allowing CPR to move trains of bulk commodities over CN's lines between Edmonton and Coho.
 - Directional running over 100 miles of track between Sudbury and Parry Sound, with all eastbound traffic on CN's lines and all westbound traffic on CPR's lines.
 - A haulage agreement allowing CN to run on approximately 300 miles of CPR track in Northern Ontario.
- ▶ November 2004: with Union Pacific Railroad, a routing protocol agreement to expedite interchange traffic at major gateways. CN and UP have established a structured plan to direct rail traffic through the most efficient interchange locations, improving transit times and asset utilization for the customers of CN and UP.
- ▶ January 2005: with Burlington Northern Santa Fe, a routing protocol agreement to expedite interchange traffic at major gateways. Similar to the CN/UP agreement, this is a structured plan that directs rail traffic through the most efficient interchange locations. The result is improved transit times and asset utilization.

Co-production and routing protocols like these are the future of North American railroading. While they are good for shareholders, who look for improved return on their investments, in the final analysis, it all comes down to giving rail customers the kind of service they need to service their own customers. By working together, the railroad industry can improve customer confidence and satisfaction with rail service. This is how we will capture traffic back from the trucking industry.

The Power of Partnerships: a Case for Shortline Alliances

If the Class 1 railroads are the arteries of North America's freight railroad circulation system, then shortlines are its capillaries. CN has direct connections with 85 shortline railroads, which originate or terminate about 25% of CN's annualized revenues, or one dollar out of every four.

Regionals and shortlines are not simply small Class 1 railroads. Their unique features make them exceptionally well suited to effectively serving their markets and the direct, head-to-head, truck competition they face.

Their strengths are different from Class 1 strengths, and it's in our mutual best interest to leverage each other's strengths. Their local market intelligence, coupled with our long-haul disciplined operation, create synergies that beg to be more fully exploited. With our size, CN brings greater schedule integrity across more of the total O&D, and greater leverage with other Class 1s at critical points of interchange. Shortlines are renowned for nurturing on-site working relationships that build customer loyalty and trust, ensuring that no customer falls through the cracks, regardless of size.

Maximizing the potential benefits of these relationships does not happen automatically. It requires marketing and operations people who consciously nurture working relationships and pay constant attention to the details that make these shared moves work properly. It requires coordinating train schedules and connections, equipment requirements, and marketing synergies.

Value Creation

A few years ago CN cut a deal with Wisconsin Central. WC was already hauling *trainload* business for CN. The new deal would have had CN hauling *carloads* for WC. WC would have had a mandate and pricing authority to woo new carload business to rail from anywhere across the combined networks, and would have paid CN a flat fee per car to haul it. Since the targeted customers had already migrated to truck, it would provide new revenues without cannibalizing current business. The shared objective was to make the pie larger.

The idea played to the relative strengths of each railroad. CN would benefit from new revenues and better asset utilization of train slots, without diverting its own resources to highly time-intensive servicing of smaller accounts in the development of small-lot, carload business.

This was thinking outside the box in exploring new ways of segmenting business along non-traditional market lines. Like the fiercely territorial animals they are, railroads define their territory geographically. What made the CN/WC proposal revolutionary was that it defined territory along the lines of co-existing market segments. Remember, our goal is to use every asset as intensely as possible. When it comes to fixed assets of train and track capacity, "If we can't use that capacity to its fullest, find someone who can."

Unfortunately, because the deal was contingent on the CN/BNSF merger, it didn't come off. However, the innovative spark was there, so a few years later, on January 30, 2001, Canadian National acquired Wisconsin Central in a merger valued at US\$1.2 billion.

In May 2004, CN completed the purchase of Great Lakes Transportation LLC (GLT) for US\$380 million. This transaction improved CN's NAFTA rail link between western Canada and Chicago, and expanded CN's role in the steel industry's bulk materials supply chain. The transaction was also good news for the Mesabi Range iron ore-producing region of northern Minnesota, strengthening its transportation ties to the United States steel industry in the Midwest and Pennsylvania.

In July 2004, CN completed its BC Rail transaction for CDN\$1 billion with the British Columbia government acquiring BC Rail Ltd. and the BC Rail Partnership (collectively BC Rail), and the right to operate over BC Rail's roadbed under a long-term lease. The purchase of BC Rail will improve BC Rail service, provide BC shippers with the shortest and fastest route to key NAFTA markets, and strengthen CN's forest products business. The combined CN/BC Rail networks will generate revenue gains from market share captured from trucks and will produce cost synergies from operating efficiencies and greater asset utilization.

Getting the Message Out

Let's consider another outside-of-the-box idea – actually carrying our message to other railroads.

The vast network of North American railroads is only as strong as its weakest link. Whatever strengthens the weakest links makes the whole network stronger. Since we're part of an open network and can't hide what we're doing, we don't gain anything by being secretive about our techniques.

So why not go the other way? Why not offer what we've learned to other railroads, to take or leave as they see fit? And isn't it in our own best interests to do so? And in their best interests to buy in?

After all, a bigger share of the freight transportation pie means more pie for us all.

The Higher Performance Environment

A lot has changed at CN in the past five years, and it hasn't always been easy. One thing that hasn't changed – and won't – is that we must continue to stay focused on the five guiding principles of Service, Cost Control, Asset Utilization, Safety, and People. If we don't maintain that focus we risk losing our edge, and if we lose our edge, if we stop innovating and evolving, stop getting better,

"The 'precision railroad' creates an environment where the only question is, 'Can I do it better?'"

Claude Mongeau,
CFO, CN



we could become just another name in a long list of recent corporate casualties – Xerox, Nortel, Air Canada, Bethlehem Steel.

As we saw in the preceding section, each improvement we make allows us to make more improvements, some we couldn't have made previously. Once you start that process of continuous improvement, however, you can't stop when you get to the top. While we may be on top now, we can't rest on our laurels or become complacent. We have to keep getting better at what we do. It's the only way we can continue to thrive and grow in today's extremely competitive business environment.

We have a responsibility to our shareholders, our employees – over 45% of who are also shareholders – and our customers to ensure that CN continues to thrive and grow. We have a responsibility to the community in which we operate, and the environment in which we all live, to ensure that we do what we do as safely and as cleanly as possible. And we have a responsibility to those who come after us to pass on a company that is even more successful than it is today.

“CN's results were nothing short of spectacular. The results provide further confirmation that despite having the industry's best margins and returns, CN management is not resting on its laurels. We expect margins to improve further.”

Jim Valentine, Analyst, Morgan Stanley

CN Profits Hit Record, Traffic World, 2004

They Also Serve...

Most of this book has been about how the five guiding principles have made CN the best railroad in North America at meeting the transportation needs of its customers. As we've mentioned in earlier chapters, just because you aren't directly involved in operating the trains that move the customers' goods, don't think that the five guiding principles don't apply to you.

Wherever you work in CN, whatever you do, the five guiding principles are as critical to “doing the right thing” in your job as they are to a trainmaster or general superintendent. As we've said before, if you aren't serving the customer directly, you are serving

someone who does, or serving someone who serves someone who does.

The ultimate goal of all our jobs is to create value for our customers and our shareholders by providing good service to our customers or internal clients, by controlling costs, by maximizing the utilization of resources, by committing 100% to safety, and by providing good leadership.

The Last Word

The Final Ingredients

So why are all businesses not equally successful? The principles you have read about in this book are available to anyone in any business. Indeed a lot of companies have sound strategies and may have ideas that look very similar to ours. This makes sense because the principles we apply to running a great railway can be applied to any enterprise.

So why do some companies, and some people just do better and go farther on a consistent basis, year after year. Two words: integrity and passion.

Integrity

Achieving, winning, whatever you want to call doing your best, is only meaningful and can only last if we are keeping a true score. Yet we all know that there are many institutions, companies and individuals that have taken shortcuts, misreported and outright lied. In the end they cheated their fellow workers, shareholders, communities and their families. They caused a lot of people financial ruin and many more people great pain.

Integrity is different. Integrity is putting in the real numbers, not the numbers that people may want to hear. This applies whether you are the chief financial officer or a track foreman. Integrity is standing up and saying, "It's my responsibility." It is at the very heart of what we are about. Integrity is "doing what you say you will." It is the essence of our principles and what we want as a company.

If we are not honest with ourselves, amongst ourselves and with everyone we deal with, then we will always be less than we can be. We will never confront and address the issues that could drag us down, or make us less.

Passion

There is one ingredient without which no company can be truly great – if it does not have it in abundance. Passion.

Passion is infectious. If you come into work each day with a passion to show everyone you work with what you are truly capable of, then you become a person others want to be around. That's tough to do every day. But, do you show excitement for what you do?

"The supreme quality for leadership is unquestionable integrity."

Dwight Eisenhower

What can passion do for you? It can inspire you and the people who work for you. It shows how committed you are. It reaches down inside you and finds energy, ideas and capabilities you never knew you had. Pretty powerful stuff really.

Passion makes it worthwhile – whatever you are doing.

Do you enjoy what you do? Love it, want it, care about it?

Passionate people care about a lot of things. It matters to them when something goes wrong. When a car misses a connection – they care. When a computer server breaks down at 3:00 in the morning – they care. When our customer does not get the car they ordered – they care. More importantly, they take action; action in the face of bureaucracy; action in the face of people who don't share their sense of commitment or urgency.

What's the common thread among all the stories about our people in this book? They cared and were passionate enough to not give up when others would have. A levee breaking and flooding the mainline would cause many to say “Oh well, nothing we can do till the water drains.” But the people in Memphis were not willing to lie down or accept that nothing could be done.

But there is another element here. Not only did the people get frustrated and upset looking at the flooded track, they took it personally and they took action. This is the heart of personal accountability.

Think about the people you know who are really making a difference. Can you see the passion?

Passion is essential. If you work for someone who lacks passion or you don't generate passion for what you do, you will slowly eat yourself away. You won't feel that what you are doing is important, and neither will the people who work for you. Eventually you won't be giving your best and you will begin to resent things. Life's too short for that.

If this is your story, you have to find a way to make it real for you again. To re-inspire yourself to be the best you can be. You owe it to yourself.

If you have the passion, don't let those who don't, drag you down. There are always those who will find fault with your enthusiasm. They will say you are trying too hard or you're asking too much.

Never let them bring you down to their level. Set high personal standards and strive to achieve them. This is the way of winners.

I once heard a philosophy that said, "One of the biggest decisions you make in life is attitude." I really believe this. Each person gets up every morning and makes a decision – consciously or not, on how they will approach the day.

When I finish what I do, I want to feel that it is as good as I could make it. I don't want to ever think I could have done better. Why would I spend the time of my life doing less than I can.

There you have it. How we work and why. But none of the changes discussed in this book will happen if we don't make them happen, and the only way we can do that is to change the way we think about how to run a railroad. But change is hard when it involves a set of values that we've held for a long time, values that we were told were good – the "culture" of the railroad, if you will.

Don't let that word throw you. Culture is simply a set of shared values. It's that culture we're changing. Looking out for number one is no longer the watchword. We've all got to look out for each other if we're going to make this work. And as tough-minded and ruthless as it might seem, anyone who doesn't want to be part of it, or who isn't nimble enough to get on board, will be left behind.

We have to make the case that the kinds of changes we're talking about are better for the railroad and, by extension, for all of us who make our living from it. The willingness to embrace change only gets embedded in the culture if people see what's in it for them.

Remember the ABCs of behavior from the People Principle? If the right antecedents are in place to nurture and encourage a change in behavior, and if we can be reasonably certain we'll be rewarded as a consequence of that new behavior, we'll change. But taking that first step can be tough. However, as I mentioned at the beginning of this book, we're not talking about home runs, but base hits.

We've got a long haul ahead of us, and there will no doubt be some frozen switches and washed-out bridges along the way, but with each step forward we are closer to making real our vision of CN's future.