

# Finding the Yellow Brick Road: Part 4, I Wish I Had a Brain

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Sometimes, there is more truth in fiction than in publicly available accounts. This story by Warren B. Powell, a leading researcher of real-time routing and scheduling models and frequent consultant to the motor carrier industry, and Donald E. Mayoras, a senior transportation executive and president of a trucking company, provides a view into the discussions many carriers undertake prior to adopting an optimization model. The account is too long to appear as a single article and instead is being published in serial form. This is the fourth installment.

**T**he cast: Dan Manning, President; Tom Gorman, Chief financial officer; Matt Peterson, Vice-president of operations; Ken Richards, Vice-president of sales; Bill Johnson, Vice-president of management information systems; John Breswick, Director, driver management; Michelle Corwin, Director, customer service; and Larry Michaels, Director, driver dispatch.

Allegheny Motor Carrier has just heard a presentation by Professor Walter McCormick, an expert in optimization models and decision technologies for motor carriers. Management has been looking for ways to improve profitability, and optimization models have emerged as a promising technology. Walter gave an overview of

optimization models and tried to show how optimization methods can allow a truckload carrier to globally match drivers to loads. He also described the challenges of incorporating forecasting into the dispatch process. He did his best to put his ideas into plain English, but it was clear that these new optimization models were making trucking a lot more complicated than it had been in the old days. These new systems were really smart, but how could they capture the personality of the company, the characteristics of the drivers, and the shippers?

It is now Tuesday morning. The entire group reconvenes in the conference room. In contrast with the first meeting, there is a

greater sense of urgency, a better awareness of the declining performance of the company. Everyone has arrived by the time Dan walks in and convenes the meeting.

Dan starts the meeting. "Let me briefly summarize some of the problems we are facing. First, as Tom has shown us, our profit margins are declining. Given the number of carriers going out of business and the growth of our big brothers to the north and south, I think we cannot just assume that we are going to be here five years from now. We are growing, but we are not growing profitably. If we grow 20 percent and our profits go down, then we seem to be losing money on our new freight."

He looked around the room. Ken in particular was feeling really uncomfortable. Dan went on, "Second, customer service. I think we are doing a good job here, but we have lost some accounts. Our growth is hiding this, but I am worried that we are putting too much effort into new accounts and not taking care of the accounts we have. Third and more important is driver turnover. We don't have the driver loyalty we used to, and we aren't holding onto quality drivers. Drivers are our most important employees—they see the customer the most, and they have the greatest impact on overall service. What kind of quality can you maintain with a bunch of drivers you hired two months ago and who may not be with you two months from now?"

He paused again and continued. "These are our three areas of responsibility: we must serve our customers, we must serve our drivers, and we must serve our investors. At the moment, we are doing well, but we are headed in the wrong direction. I

want to take action while we still have the flexibility to do so. The key is developing a program of continuous improvement. We have to look at every process and see what we can do to make it better. What do you suggest?"

Tom started the discussion. "We have just had a presentation on different technologies that can help us. On the hardware side, I think we should look at satellite communication with the trucks, so that we can find out where our drivers are and talk to them. More and more firms are using satellite communication, especially for market segments where tracking is important. Second, we have optimization models that can help us plan load assignments. Several carriers are now using them and getting tremendous benefits."

Bill jumped in, "I have to admit I was dubious at first, but these optimization models look really good. From talking to Walter yesterday, I know just how I would integrate a system like that into the on-line dispatch system. It wouldn't take that much programming, and it wouldn't change the way the dispatchers work with the screens. Besides, I've come up with some new ideas for reports using the outputs of the optimization."

John remained adamant. "Look, I went to the same presentation and heard the same nice words. Walter talks a good show, and he's been around long enough to know some of the issues. But there is no way a computer can do driver dispatch. There are just too many things you have to take into account, and you have to be there on the phone, hearing the driver's voice. But I would like to be able to talk to drivers while they're on the road. I know they hate

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having to get off the road just to make that check call. It's just a nuisance to them. They have to find a stop, get off the road, get to a phone, sometimes stand in line, and then the line is busy and they can't talk to their fleet dispatcher! And while they're waiting to get through, they're inside talking to those other drivers. That's one of the reasons we can't hold on to them. They always think the company the other guy works for is better."

"If we could track our trucks," added Ken, "We could get more of the JIT business. Also, shippers are starting to expect to see this stuff. They're using it as a signal that you're a modern carrier with advanced management."

Bill wasn't ready to give up, "Look John, one of the things your drivers don't like is sitting around waiting for loads. With optimization, we can assign them to loads before they even call in. Walter told me that these models can look at when a driver's going to be available and then figure out in advance what loads he or she can be assigned to. Then, when the driver calls in, we already have a load. The model can even figure out if drivers are out of hours."

"Wait a minute, Bill." Matt cautioned. "We can't always trust those driver ETA's. Our service reps prebook drivers already. Most of the time, if we don't have a driver prebooked to a load, it's because we don't know exactly when that driver's going to arrive. And how are you going to handle their requests to go home?"

"Hmmm. You're right," Bill conceded. "Right now, the dispatcher enters a driver request in the comment field. We'd have to change the screens to provide a field for that. We'd also have to work on getting the

driver hours in there. We have the field, but the dispatchers don't keep it up very well. But none of this is that difficult."

"The other thing," Matt continued, "what are you supposed to do when the model wants driver A to pick up an important load, but you have no way to reach him, and driver B is on the phone, and he's not that far away. What do you do?"

"You do what the model tells you to do," Bill responded weakly.

Matt pressed on. "It seems to me that we need that data and the ability to talk to the drivers to really get the benefits from an optimization model."

Tom broke in, "Or you could say that you need an optimization model to get the benefits from an expensive satellite system. Remember, the optimization model is the least expensive bit of technology. Radar and communication units cost about four thousand dollars per tractor. That's over four million dollars for us, cash money. And then we start with the line charges. I figure we'll spend over two million dollars a year on this system. We need to be sure that it will really save money for our company, and not somebody else's."

At this point, Dan broke in. It seemed as if they were looking to buy a solution through technology, rather than changing their own approach to the business. A strong believer in total quality management, he felt that a people solution was the best choice. These technologies might work, but only if they improved their own internal processes and culture first. To him, it seemed that optimization would take decisions out of the hands of his dispatchers and customer service reps, and he was worried about the effect that might have.

"Look, let me try this from a different perspective. What are our quality problems?"

"Missed loads, missed deliveries." Ken responded immediately.

"Drivers waiting, nothing to do, or going in the wrong direction," countered John.

"Empty miles," added Matt. This was the statistic that he was measured by every week.

"OK, let's start with that," Dan continued. "Now, why do we miss loads?"

Matt thought a bit. "Well, most of the time we probably booked too many loads in one region. But sometimes it's because the driver was out of hours and couldn't make the delivery as fast as we thought. In some cases, a driver will refuse a load because it's just not going in the right direction. Other times, a couple of drivers would arrive late, and we couldn't reassign them to a load. For example, sometimes a shipper will refuse a delivery, and then we have to pull the trailer into a terminal and drop it off. By the time we're done, the other shipper might have closed his dock."

Dan's eyes lit up, "This sounds like a perfect application for a quality team. Larry, how about getting the dispatchers and load planners together on this."

Larry picked up on the idea. "We could measure on-time performance for drivers, and track the reasons why they're late, like maintenance failures, or shipper problems, like getting their last loads unloaded, or getting stuck in traffic, . . ."

"or lost . . ." added John, cracking up the entire room.

After the laughter died down, Matt went on. "But sometimes we just don't have enough drivers. It can be hard to figure out when you miss loads because of these

problems and when it's because you just don't have the capacity."

"So, where do we usually run out of drivers?" Dan asked.

"Dayton and Atlanta," said Matt. "We are always overbalanced out of these areas."

Dan turned to Ken. "Is this a sales problem?"

"We have been trying to get more backhaul," replied Ken. "But you have to decide how low you want to drop your rates. If you lower your rates to get some extra business, you're eventually going to have to lower them on all your business in that lane. At some point, it's better to move the empties."

Dan pressed on, "How do you plan the empties?"

Matt responded again, "Most of the time, we move empties because we have excess drivers. We always try to load a driver, but if it looks like we can't, then we look to neighboring regions that might need drivers."

"In manufacturing, they call that a push system. Nobody uses that anymore," Dan noted. "What if we try a pull system? Focus on the customer, and move drivers to meet demands. Try to anticipate what the customer will need, and make sure you have the capacity to serve it. Right now, we are reacting to customer demands, and when the capacity isn't there, we are scrambling, running empties, and missing loads."

"But this isn't manufacturing. I can't just put in an order for more capacity." Matt complained. "We have to get it from the regions that have too many tractors. And they don't come from one place."

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"Same as in manufacturing. It's called an order lead time. Do you think that when you're building refrigerators you can just order more compressors? And if your supplier runs out, don't you think you could go to another supplier?"

"That's true," Matt conceded, "but a lot of regions need tractors. It's just that some need more than others. The Atlanta region gets capacity only when another region is willing to give them up. And the dispatcher there might want some extra tractors to insure covering his own loads."

"So, we have a coordination problem." Dan felt like he was making progress. "Look, how many places have capacity shortages?"

"Like I said, Dayton and Atlanta are always running out. We have to be careful who we book loads for, so that we can cover our main accounts. Then, a couple of other areas like Louisville and Des Moines will sometimes run tight."

"Now where do you usually have too many tractors?" Dan asked.

Matt knew the major empty lanes by heart. "We tend to empty out around Dallas and Jacksonville, Florida. We also get extra drivers from New York, around Albany. Then we have some other areas that don't cause us too much problem."

"Where do these tractors usually move to?"

Matt went to a flip chart in the corner of the room and tried to draw a map of the US. His efforts produced a few grins, but Dan waved them off. Matt then drew arrows showing the major movements. "On any day, we deadhead drivers in all different locations, but these are the major lanes."

"The way I see it," Dan went on, "you have three major empty lanes. Dallas to Atlanta, Jacksonville to Atlanta, and Albany to Dayton."

"But we don't move trucks empty over those distances." Matt jumped in. "What we do is push the Dallas drivers east into Mississippi, Mississippi drivers move toward Alabama, and Alabama drivers move to Atlanta. We call it checkerboarding."

Dan listened to Matt's description. "Good! Now, all we have to do is change that push to a pull. What if we create a special quality team. Get the customer service people for those areas to meet twice a day. We'll get them to prepare forecasts of what they are going to need that day or the next and estimate how many drivers they will have."

Matt started to pick up on the reasoning. "They could anticipate the day before how many drivers are needed and start to plan assignments working backwards from Atlanta. That way, we wouldn't use an Alabama driver on an Alabama load when that load could be covered by a Mississippi driver and the Alabama driver could move to Atlanta."

Dan nodded. "What you do is to create a team that is responsible for the entire lane."

Ken interrupted. "But what about the other regions? Shouldn't we really have one team for the whole company?"

"We do," Dan answered, "but that gets too complicated, and everyone ends up focusing on his or her part of the operation. The major bottleneck in our ability to deliver capacity is coordinating driver movements in these key lanes. Dallas to Atlanta is the most complicated, since the distance is too long. But Albany to Dayton, where

we have heavy demand, would just require two customer service people. The main thing is that each region in a lane prepares a forecast of loads and drivers each day, and then all the regions in an empty lane coordinate their needs so that drivers can be moved from places where they are not needed to places where they are."

"But what about all the other regions?" Ken continued.

Matt responded, "We don't really have problems there. Those regions are pretty well balanced. They take care of themselves. Our problem is that we have to coordinate the areas that produce drivers with the ones that consume drivers and make sure that these lanes do not become bottlenecks." He leaned back with satisfaction and looked at Dan, who grinned.

Larry Michaels had been quiet through most of the discussion, but he had been listening carefully and was a little uncomfortable with the approach being adopted. "Look, this seems like a good approach for taking care of the big issues, but managing a fleet is made up of thousands of little decisions of what to do with each driver. These coordination teams may help with empty repositioning, but most of the other regions are pretty balanced, and we still have problems. It doesn't change the fact that we have to decide what driver to put on what load. This is still handled mostly by the customer service reps, and they can't take into account all the driver issues. We still have to fix a lot of the assignments."

Surprisingly, Michelle agreed with Larry's basic argument. "It boils down to the details. I really like the coordination teams," she glanced at Dan, who was listening intently, "but I have to cover loads,

including getting the hot loads out, but try to minimize empties, and keep the drivers happy. We get measured on on-time performance, empty miles, and productivity, but sometimes we have to work against the dispatchers."

Larry nodded and added, "We don't have a consistent way of resolving conflicting goals. Customer service people focus on service and empty miles, but they don't know about drivers. The dispatchers know the drivers well, but they don't really control the dispatching, and it's hard for them to balance customer issues and empty miles."

"What if we introduce load planners," Ken suggested. "I know some other carriers that have done this. The customer service reps just book loads. Dispatchers dispatch them. But it's up to the planners to match drivers to loads. The planners can then balance priorities more easily."

"But I thought we used planners," objected Dan.

Larry and Michelle glanced at each other. "We have one planner," noted Michelle, "but he's really more of a trouble shooter. The customer service reps can call him when they get caught short or might have to miss a load. The main planning is still done by customer service. We tried to use planners, but they couldn't handle all the loads, and the shippers needed a commitment while they were on the phone. So we had to leave load matching with the customer service reps."

"So why not use more planners?"

"It doesn't matter," countered Michelle. "You still have the problem of booking a load and then waiting half an hour before the planner tells you that you booked too

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many loads.”

“The other problem,” Matt added, “is that the planners didn’t really know the shippers or the drivers that well. They did a good job with minimizing empties, but they really didn’t do any better job of handling the drivers than the customer service reps did.”

“What if you use an optimization model to assign drivers to loads?” asked Larry. “The way Walter described it, we could code in trade-offs between goals and let the optimization model sort through it all. The model would try to handle both driver issues and service issues at the same time, as well as minimizing empties.”

Dan was skeptical. “I’m still not sure about the data problems. How reliable would the model be?”

Michelle leaned forward. “Well actually, if you think about it, most dispatches are pretty straightforward. If we tune it right, the model could probably handle at least 90 percent of the assignments. The planners could focus on the exceptions and work with the service reps and the dispatchers to solve them. You could probably get away with three or four at the most.”

“Why use any planners?” challenged Matt. “If you are just handling exceptions, let the customer service reps do it. They’re going to know more about the situation anyway.”

Everyone fell silent for a moment, thinking about this arrangement.

Larry spoke slowly, thinking about how the new operation would work. “An optimization model could find the best driver to cover a load and would do a better job of making sure every load gets covered. Sometimes we have loads that just drop

through the cracks. And the optimization model would do a better job of minimizing empty miles.”

“It would be like a super planner,” Matt added, “and we wouldn’t have the delays. We would know right away if we could cover a load and how. This would help the customer service reps booking loads.”

Bill looked up quickly. “Would it be that fast?” He was trying to think how the system would actually work.

Matt looked a little surprised. “I don’t know. It’s a computer model . . . I assume that it could tell you right away.”

Bill wasn’t sure but kept quiet.

John remained skeptical, but the others around the table seemed to be in agreement. But Dan was feeling a bit uncomfortable and felt that he needed to sort through the options. He closed the meeting and walked down the hall with Tom and Matt. “Guys, how about a beer? I need to relax and sort through all this.” Both agreed, and they arranged to meet at a popular watering hole nearby after work. Dan retired to his office to organize his thoughts.

(To be continued.)