

methods, all these philosophies, at last, merged into a coherent whole.

"But you didn't come here for a theoretical lecture. You want to see what can be done with it. In reality. What results can be achieved? In what time frame? And above all, how?

"What I'm going to do now is to share with you one of the most fascinating experiences I had last year. How, in UniCo, they turned around a losing company they bought. Turned it into a gold mine in just a little over three months. But my first hour is over and I was told to break for coffee. If you are still interested, be back in twenty minutes."

Chapter 12

I see that not all of you are back. Okay, I've learned my lesson. No more of that heavy, boring stuff. Instead, I'll tell you a story, everybody likes stories, about my most significant personal experience at UniCo.

One day I was called to the office of Don Pederson. He is a vice-president, but not like the other vice-presidents. Nobody reports to him, except for a few assistants. That doesn't mean that he is not important. At least for me he was very important. He is the one who signed my grant.

Anyway, until that day, my contact with him had been only through memos. I liked his memos. They were polite, short, and each one meant another trip. At that time I had been with UniCo for about six months, and it was the first time I was to meet him in person. I didn't have any problem finding his office; it's right next to the office of the CEO, which is supposed to mean something. Exactly what, I never found out.

Don is a very pleasant and open person. Surprisingly young. I doubt if he is much over thirty. But this guy taught me a lesson I'll never forget.

We had a lengthy conversation about the last place to which I had been assigned. It was a huge distribution center, and I showed him how they could optimize their truck schedules. According to my calculations, they could save at least fifty thousand a year. He showed a lot of interest, asked a lot of questions, and even looked at my elegant solution to a complex set of equations. I felt good. Here I am, the knowledgeable professor, teaching an executive how they should scientifically run their business.

I'm embarrassed to think about what he actually thought of me. A professor who spent a few weeks in a distribution center that turns more than half a billion dollars a year, and all he can come up with is a convoluted way to save, maybe, fifty thousand bucks.

But Don was polite. He said that it seemed they could use my talents. Then he told me how. They were about to acquire a new company, a steel mill; they expected to sign the documents next Friday. A month before, Don had devoted two days to do a brief analysis of that company. He suggested I fly there the next day, do an in-depth analysis, and prepare my recommendations. I liked it. I know a lot about the steel industry. I have published four articles about it.

I liked it a little less when he suggested he would meet me there the weekend after the company exchanged hands and we would compare notes. I was about to tell him my doubts, that a proper analysis couldn't be done in the ten days that were left, that you can't compare a riffraff analysis to a professional one, but I decided I'd better not. So I went.

They were waiting for me down there. I worked frantically. During the day I interviewed people, and nights I read tons of reports and tried to make some sense out of the piles of data I was accumulating.

At first I felt drowned. Slowly the picture started to unfold. The company, like many other steel mills, was losing money, hand over fist. But that's to be expected when competition is so fierce and steel prices are depressed.

The clients, when you dismiss their usual tendency to bitch and moan about their vendors, didn't have particularly bad complaints. Delivery lead times and due-date performance were comparable to the competition. So were prices, of course. Quality was slightly better, but not significantly.

Technology was good. Most equipment was state of the art. Except for the slitters, the machines that cut the plates to size. That equipment was bad, slow and wasteful. It must be replaced. I did the calculations. The payback was not much more than three years.

Inventory was a problem. Mountains of plates filled the company's huge yards. And it wasn't stored well; much of it was rusting. I spent a lot of time trying to find out what could be done. It wasn't easy because everybody was blaming everybody else. Finally, I found out that what they used for planning the work of that complex operation was an outdated computer system. Can you imagine? They invested a fortune in the furnaces, and another fortune in the rolling and coating departments, but they still used software written in the seventies. These steel people, I'll never understand them.

Raw materials were also a problem. Not the materials themselves, but the price they pay. They had to organize their purchasing differently. I spent a lot of time on it. I optimized the system. I was ready to show Don how, with three fewer people in the purchasing department, they could handle the same quantities and save a bundle. Minimum a million dollars a year, maybe even a million and a half.

On Friday they signed. I expected Don to arrive on Saturday morning. I was ready for him. But he called and said he had to finish something important and he would arrive on Sunday afternoon. I used the time to polish my calculations.

Sunday, at seven P.M., I was still in the lobby pretending to have tea, when he entered the hotel. He asked me to join him in his suite. I was eager to show Don my findings, to show off. So, I grabbed my papers from my room, decided that ten minutes was enough for him to freshen up, and knocked on his door.

He didn't want to look at my papers. His first question was, "What is the constraint of the company?"

I had spent enough time at UniCo to expect such a question. Naturally, I was ready. I handed him my list of constraints. Twenty-six of them. He glanced through the list, these executives read very fast, sighed, and put it aside. I wasn't surprised. With such a long list of problems, you would sigh too.

Then he asked me how much time, according to my analysis, it would take to bring this company to profitability. I didn't have an answer. Out of desperation I answered that it depended on what would happen to the price of steel in the market.

"Assume it stays at current prices," he said.

As far as I could tell, at current prices this company would never be profitable, but how can you say such a thing to someone who just bought it?

I remembered the joke about the person who committed himself to teach a dog to read in three years. He hoped that in three years the dog would die or the owner would die. Knowing how frequently steel prices oscillate, "In two years," I confidently said. Thank God he didn't ask me to justify it.

Rather, he asked how much money I thought had to be invested. For this I had a detailed, accurate answer. But once again he refused to look at the papers, he just wanted to know the bottom line. I hated it. But he was the one who signed my checks, so I told him: twenty-two million, three-hundred and forty thousand dollars. Approximately.

"I see," was his only comment. And then . . . And then he just said that the limo would pick us up at seven tomorrow morning, and accompanied me to the door.

Next morning they were waiting for us in a big meeting room. All the top managers, about twenty of them. We shook hands and then Don took over.

He told them that he didn't know much about the steel industry, and even less about their operation. And he asked them to help him to understand better because the more he knew, the less likely he would be to impose stupid decisions on them. He

didn't leave any doubt that he was going to make some decisions.

Then he said that he had read all their financial reports, but that these reports did not tell him a thing about how they actually operate their company. He knew that for a long time "tons-per-hour" has been the prime operational measurement in the steel industry. And he asked them if they thought they were doing a good job monitoring tons-per-hour.

They thought they were. For about half an hour they explained, in detail, how they do it; on a work-center level, a departmental level and on a plant level. They explained how the data is gathered and processed. They presented the resulting reports and the graphs of tons-per-hour per shift, per day, per week, per month, per quarter, per year.

Throughout the explanation Don was very encouraging. When they were through, he agreed that there was no doubt that they were doing a thorough job monitoring tons-per-hour. He asked me for my opinion. I said I was impressed; that only now did I realize the meaning of a Prime measurement with a capital P.

Don was quiet for a while. And so was everybody else. At last he said that he was convinced that they were doing a good job monitoring tons-per-hour. What he was questioning was, should they?

For them it was heresy. In their world, the steel world, tons-per-hour is one of the pillars of their paradigm. It took them some time to digest that they are allowed to question it.

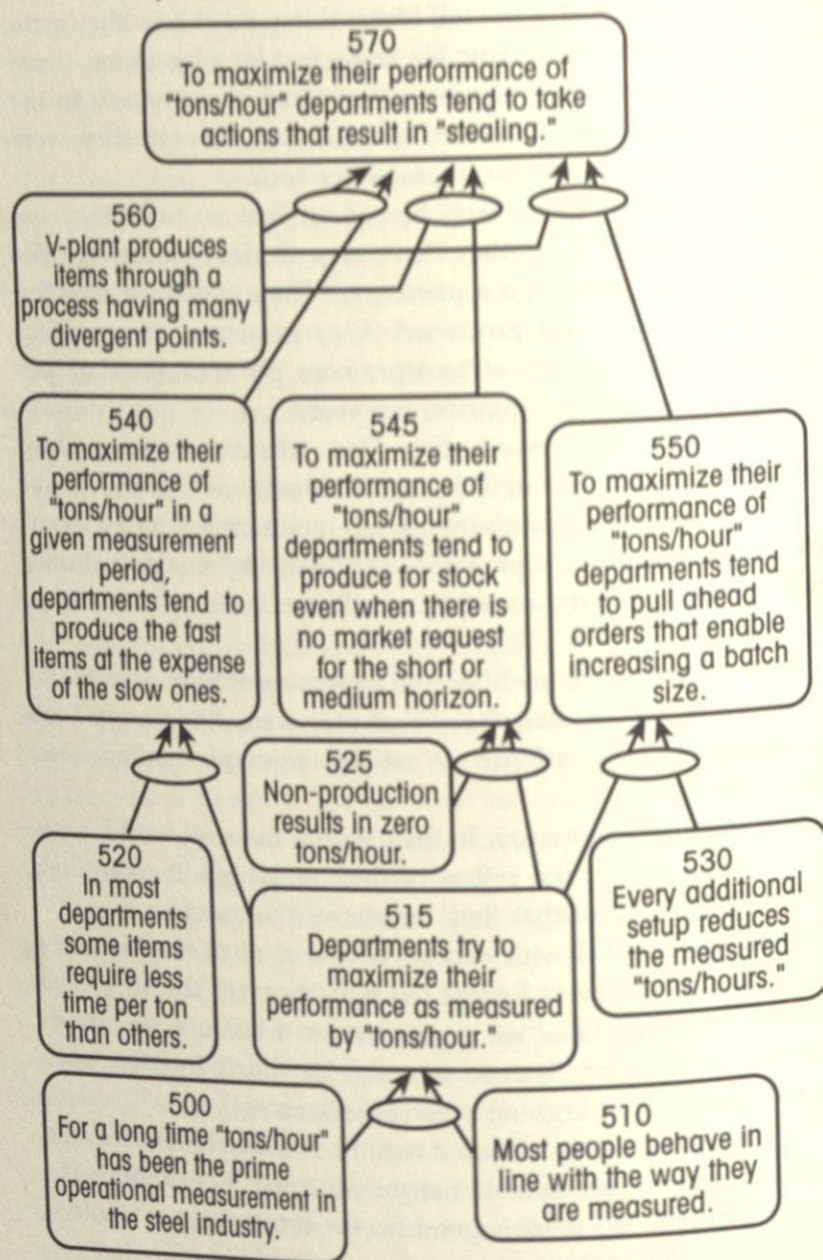
Don was flooded with reasons why they must monitor tons-per-hour. In my eyes, I must tell you, many of the suggested reasons sounded like "we must monitor it because we always monitored it." Don listened intently. He didn't interfere even when they started arguing among themselves.

Finally, when they calmed down, he reminded them that the main reason for an operational measurement is to induce the departments to do what is good for the company as a whole.

They had to agree.

At that stage, Johnny put up a transparency.

I know that it's difficult to read from the screen, so I'll read it, the same way that Don did.



Don started from the bottom. In the steel industry, each department is judged according to how many tons they process per hour; the measurement of tons-per-hour is the prime operational measurement, statement 500.

He then quoted the famous phrase, "Tell me how you measure me and I'll tell you how I'll behave." He didn't have any problem getting agreement that most people behave in accordance with the way they are measured, 510. Then he reached the conclusion that in the steel industry, we are bound to find that departments try to maximize their performance as measured by tons-per-hour, 515.

Without hesitation, they confirmed it.

What does this lead to? On its own, it might make sense, but not when combined with other facts that exist in the industry. Like the fact that in almost all departments some items require less time per ton than others, 520. For example, in the rolling department, you squeeze red-hot steel into plates to produce ten tons of two-inch thick plates, which takes much less time than to produce ten tons of one-half-inch thick plates. The result must be that in order to maximize their performance of tons-per-hour in a given measurement period, departments tend to produce the fast items at the expense of the slow ones, 540. You can imagine what this leads to. High inventory of the fast items, while missing orders on the slow items.

They discussed it at length, debating the magnitude of the resulting damage. Some tried to minimize its significance. Don didn't argue. He didn't have to. The other managers did it for him. They brought up hard numbers to prove it. The numbers weren't funny at all. Everything was in the many millions. Actually, the accompanying anecdotes were very funny, if you have a twisted sense of humor like I do.

When that was settled, Don moved on to highlight that in the steel industry, significant setup times exist in every department. Twenty years ago a setup of twenty-four hours was common. Today, due to new technology, most setups are more in the range of three to five hours. Still significant.

Everybody knows that setup reduces the tons-per-hour. While you are doing the setup, you produce nothing, 530. Don asked them how long they would run after a four-hour setup. Minimum a whole shift and usually much longer, was the consensus. And if there are not enough orders? After these questions nobody argued with the conclusion: to maximize their measurement of tons-per-hour, departments tend to process orders ahead of time and out of sequence in order to increase the batch size, 550. Once again they discussed and tried to quantify the unavoidable results, the unnecessarily high inventories and unreliable due-date performance.

The worst situation for a department is to be idle. Non-production results in zero tons-per-hour, 525. It's no surprise that to maximize their tons-per-hour, departments tend to produce for stock, even when there is no market request on the short or medium horizon, 545. This definitely doesn't help the inventories.

At that stage I thought I finally understood why they have such mountains, and I mean mountains, of inventory. And why even though they promise that they will deliver a new order in seven weeks, they succeed in only about sixty percent of the cases. But I was wrong. The real killer was about to come.

What typifies the base industries, steel being one of them, is that the nature of their process is to have divergence of products at each stage of production. For example, in the rolling department, they produce many different plates from the same type of steel. Plates different in thickness. Once you produce a two-inch-thick plate, and later you change your mind and want to turn it into a one-inch plate, it's too late, the steel is already cold. It's the same in the slitting department, where they slit the plates to size. If you slit a plate to be seventy inches wide, you cannot later make it eighty inches. In short, in the steel industry, items are produced through a process having many divergent points, 560.

Now combine all this with each of the facts outlined in 540, 545 and 550, and what do you get? You get that to maximize

their performance of tons-per-hour, departments tend to take actions that result in "stealing." No, nobody suspects that a worker puts five tons of steel in his pocket when he goes home. It's much worse.

For example, we prepare a specific plate for only two near-term orders; ten tons for sixty-inch-wide plates and another ten tons for seventy-inch-wide plates. The setup time in the slitting department is about three hours. To slit ten tons takes less. They try to run at least a full shift on the same setup. What happens? They slit all the twenty tons into one width and then scream hell that they were not given the material for the other order. You can imagine the resulting finger pointing, not to mention that on one hand we have a very unsatisfied client and on the other, plates with no demand.

Don guided them in making estimates of the resulting negative effects. They estimated the impact on lost sales, excess inventory, wasted cost, long delivery lead times, unreliable due-date performance, and, not less important, time wasted in heated quarrels between departments. The numbers were staggering.

Then, Don asked if they had any other problems. In the ensuing three hours I got a lesson in how to handle complaints. Don didn't dismiss anything they raised, even though some of them looked to me like pitiful excuses. With each problem they raised, Don made them quantify the negative impact. Then he guided a discussion of how much of that impact is due to what was already described on his diagram. He kept on referring to it as their current-reality-tree; the logical description of the effects stemming from the fact that they operate in the environment created by the tons-per-hour measurement.

It was amazing. For example, they complained about their vendors not always delivering on time. Don made them realize that if they did not produce so much excess inventory, they could hold much bigger stocks of raw materials. Vendors not delivering on time would then become a minor point.

Or, the problem that clients sometimes change their minds at

the last moment. After inquiring, 'last moment' turned out to be four weeks before delivery. If lead times were much shorter, this also would not be a problem, as they would have delivered before the client had a chance to change his mind.

To make a long story short, they became convinced that all the other problems were either relatively insignificant or were significant because of the existing chaotic environment. There was a real, true consensus that the core problem, the constraint of the company, was the fact that their prime operational measurement was tons-per-hour.

Don pointed out to them that this was actually very good news. Yes, very good news, because all their competitors suffered from exactly the same core problem. Correcting it would give this company a tremendous advantage.

You're probably asking yourselves, like I did, how come the steel industry uses such a devastating measurement? The answer is that their systems, like every other industry, are based on the cost world. Remember the basic assumption of the cost world? The only way to achieve good cost performance is through good local performance everywhere. If you believe in that assumption you'll be forced to use a measurement like tons-per-hour.

Now you understand much better why TOC claims that currently the core problem of our organizations, the constraint, is the fact that so many of our management systems are based on the belief that the assumptions of the cost world are valid.

You can imagine how embarrassed I was remembering the list of twenty-six constraints I had handed to Don just the previous evening. Now I knew why he hadn't bothered to read it. Once you understand TOC you realize that there are no real-life systems with twenty constraints. Such systems will be chaotic to the extent that reality will have eliminated them a long time ago. Real-life systems have one, maximum two, constraints.

I also understood that I did not have the tools needed to enable me to identify the constraint. No wonder. That was the

first time I'd ever seen a proper analysis, that I'd seen a current-reality-tree.

At the opening of my talk I said that in my eyes the most important contribution of TOC is the research methods it introduces. Now you understand why. The thinking process of TOC, called the evaporating cloud, caused a revolution in my work. This method, or better still, this thinking process, is the antithesis of what I was used to doing.

Presenting a problem as a conflict between two necessary conditions makes a lot of sense. But I was almost programmed to proceed to find a compromise. In academia we don't call it compromise, we call it optimize. Three-quarters of my articles are optimization models of some kind. You can imagine how difficult it was for me to accept that a much better solution, or even solutions, emerge by refusing to attempt to find a compromise, and instead concentrating on exposing the underlying assumptions.

The cause and effect thinking processes of TOC, one of which is the current-reality-tree, forced me to go through another paradigm shift. But after that experience with Don I was not about to continue fiddling with symptoms.

I had spent ten days interviewing everybody, just to reach the decisive conclusion that this operation would never be profitable, unless steel prices went up substantially. Along comes Don, and in one month, yes, one month, he made them profitable. A month later he dealt with the next constraint, their marketing policies. And today this same company has the same people, no worker was laid-off, no manager was replaced. And has the same equipment, not one piece of equipment was bought. This same steel company is now a gold mine.

Well, that's my story. And the time is up. So, if you have any questions . . .

They held him there for another hour.