PROFESSOR: So welcome to Lean Thinking Part II. We're essentially going to pick up where we left off last time in discussing the Lean framework of thinking about value, the value stream, flow, pull, and perfection. Hopefully the video gave you some real active sort of visual representations of what some of these concepts might mean.

So let's talk about flow. We would like, if we have a value stream-- this is a patient value stream. We have people coming in and going through diagnostic procedures, and hopefully leaving in better shape than they came in. And we would like to create flow in this system.

We have to think about a bunch of things. We obviously want to focus on what is flowing. Again, the value stream map is a map that looks at the product, in this case, the patient flowing through the process. We don't want to be limited by organizational or people boundaries. It's not a value stream map if it follows organizational work or an individual's work. It's really about the product.

And first order, we want to make sure that there's the minimum amount of buffers in there, inventory. Here's a waiting room full of people. That's not flow, right? And it's interesting to me, as a non-medical professional, to just sort of observe things from a Lean perspective. I have had both good and bad experiences as a patient, or the parent of patients. Sometimes it's this. You're sitting in the waiting room for five or six hours.

And sometimes it isn't. I've had sort of astonishing experiences with well-organized medical facilities, where literally once, I didn't have time to sit down. They gave me a little form to fill out, and before I had finished filling out the form, they were calling my name to see the doctor. It was it was a well-organized system that had flow. But bottlenecks are going to slow that down.

Buffers, essentially the same. Wait time in between steps. Sometimes that's necessary. You have an expensive facility like a CAT scanner. You're not going to risk not using that facility, so people are going to have to wait for it. But to achieve flow, you need to minimize that.

And one of the key things to think about is time it's an essential metric. Our discussion today is going to really be about how do we measure and define time. Time is sort of an obvious thing. But when you start thinking about measuring and defining it, it does get a little bit complicated. You have to think about it carefully.

And the key is really to understand the definition of how the time is measured. And one of the problems here is that the terminology-- there's some terminology here-- is not standardized. So in different fields, industrial engineers and supply chain people will talk about things using the same words. They mean different things. Sometimes the words are used in a way that isn't intuitive.

So rather than try to teach you the jargon of any particular field, what we're going to ask you to do is think about time and make sure you understand and communicate your definitions of time. And we'll actually have a little exercise about that.

So wait time. That's relatively simple. If something is just sitting there, it is waiting. So there is work in progress. The work that you're trying to do is not moving forward. That's wait time. And it's also called queue time, delay time. Again, the terminology isn't particularly standard. The concept is pretty easy to understand, though.

Processing time, on the other hand, is a little bit more complicated. So now something is happening to the work product. Some sort of resources are being consumed. Maybe a person is working on it. Maybe a machine is working on it. And that could be value added or non-value added. It could be an active or relatively passive use. There are multiple names for it.

Touch time-- I kind of like touch time because it's intuitive-- means, in, for example, engineering or health care work-- someone is working on it. Both of those fields are very people intensive. If somebody is working with the patient or working with the diagnosis or working with the engineering drawing, that's touch time. It's also sometimes called in process time or response time in the sense of how quickly can the people respond to a demand that they get something done.

And these things tend to pile up in ways that are kind of illustrated here. In a simple case, if you had some work you need to get done, well, first it waits. Question.

AUDIENCE: [INAUDIBLE] there was an oven [INAUDIBLE] shoes, and you heat the thing up, but then you would open the oven to let it sit and not touch it because it was cooling off.

PROFESSOR: That's right. That's right. That's classic, right? OK, so is that wait time because it's cooling off? But it's occupying the oven. It's not touch time. The guy is not working on it. He can go do something else. But the equipment is used. So that's classic. And I don't have an easy answer for you. It depends on what you're measuring. If you're measuring the equipment, how many ovens do we need? You better account for that cooling because they probably don't want to yank it out. It'll cool too fast.

So if your concern is the oven, you got to count that. If your concern is the worker, that part doesn't count. If your concern is the shoe, it's in process in some way. It's cooling off. You can't say that's wait time because you can't make that go faster.

Another classic one is painting. You can't make paint dry faster. Well, you can. You can blast hot air on it, but that may or may not be a good thing. And that's exactly what I'm trying to get across here, is that the time has a lot of sort of unexpected complexity when you're looking at these things, and you have to think pretty straight about it.

So you could be waiting, you could be doing value added work, you could be non-value added, but still in processing. We stuck the glue on. Now we're cooling off. We're still using the oven. We can't leave the oven, but it's not really value added. Maybe we could do that in a different way. Maybe it's necessary non-value added. Maybe we'll call that yellow.

At some point the processing ends and we go back into inventory, and we're waiting again. Sort of imagine that cycle repeated lots of times to finish our overall process. And cycle time is our overall time. There isn't a whole lot of confusion about cycle time means overall time, wait plus processing. There's some other names for it.

The thing you have to really watch out for, cycle time is cycle of what? It could be the cycle of a machine, ka-chunk, ka-chunk, ka-chunk. That's seconds. It could be cycle of the overall shoe manufacturing process, which, in New Balance, was an amazingly short three days. But in aeronautical, engineering, cycle time of an aircraft life cycle, 20 years. Cycle time can mean a lot of different things. You've got to just define your boundaries very carefully when you're talking about cycle time.

So now we have a little exercise. We're going to ask you to tackle some of these complexities. I hope everybody held on to this sheet. You were using this before. We call it 5Sing out of existence. You clean up something you really need, and then it's gone. I hope that didn't happen because now we're going to look at the times, and we're going to do a little exercise. We're going to add up the overall cycle time of an order from the time the customer walks up to the time they get their hot dog.

The tricky thing is these times are not necessarily in the right units. Make sure everything is converted to time per order. Is it time for a hot dog? Subtle. What's the average order? Does anybody remember? Two hot dogs, right? And we got to worry about rework. There's some percentage chance- we're looking at the average-- there's some percentage chance that things are going to have to be done over.

So this actually gets pretty well at how tricky this can sometimes be. so? Try to normalize the times, sum them up, and use the sheet. This is actually a group exercise. If you guys want to divide and conquer, or if you just want to see what people get, whatever, whatever strategy you want to take to puzzle this out is fine. But you only have a little under 10 minutes. Why don't we give it till, like, three after to do this exercise?

AUDIENCE: I see what you're saying. It shouldn't take 20 seconds to put a hot dog in a bun. So 20 seconds to put it in the bun, and then about 10 seconds putting it [INAUDIBLE].

AUDIENCE: Exactly. That's how I interpret it.

PROFESSOR: All righty, what do we got? One of the fun things about this class is our sort of unintentional experimenting and work styles. Some people were just doing away. Other people were talking waving their arms and stuff. It was interesting. Let's see if what this process yielded.

I'm numbering you guys M1-3 and E1 and 2. So first medical option table. What do you got? 449. OK. Interesting. M2. 393. OK. What do you guys got? You have different things. Give me a sample. See, this is the table that didn't talk.

AUDIENCE: [INAUDIBLE] around 300.

PROFESSOR: Around 300. OK. Plus or minus. All right. And E2. 432. OK. There we go. There we go.

So we didn't exactly agree. We're going to give you guys sort of an answer sheet later so you can figure out. But it sort of illustrates the issue of the squirminess of this. It's a very simple process. We gave you the times. But how do you interpret them exactly? How do you do the rework? Do you average that in?

Probably the most reasonable thing to do would be to add 10% to all of the things that might have to be done over. But there's actually a couple of do over loops, so do you add 20% to that one? I'm not sure. You could interpret that a couple of different ways.

More importantly, or more significantly-- it has a bigger impact on the numbers-- what do you do with the stuff that's kind of off the main process loop there, the cleanup? Do e you average that and put it in as a sort of tax against each hot dog order? Or do you say nah, they'll do that when it's quiet. It shouldn't count.

And that's probably the difference between the people that we're up above 400 and the people down around 300. Does that make sense? I have the 300 people were leaving that out because otherwise it's hard to get a number that small. This is pretty much-- that's somehow one second higher than the number you get if you add 10% to everything and tax with the cleanup. So that's real close to that number.

So there's different ways to do it, and they're all legitimate. But it gives you a feel for how this is not an exact science. And again, if we wanted to get more exact, we would have to go to the [INAUDIBLE]. We might have to stand there with a stopwatch and watch the customers come and go, and see what actually does happen.

For example, the cleanup issue. Do they really have time to do it on the side, or do they have to actually make customers wait while they do that? You don't know until you go look. So again, an illustration in how this can be a little tricky. And we're going to go even deeper on this later this afternoon. But for now, that exercise is done.

Just an explanation of something we've had kind of across the bottom as an icon for a while. These things are called time value charts. They're useful if you want to make broad points about the use of time. This is a typical example, in a lot of ways. Here's a process that takes a while. Apparently there are two spans of four days of solid work in this process, as well as a lot of wait time and a lot of non-value added working time.

One of the key things that this kind of chart will tell you about almost any process-- it's very bizarre if you come up with a process that isn't this way-- is that the big time savings are in the wait times and the non-value added times. And people were talking about the issue of standardizing work and eliminating creativity. What I always tell the engineers is this is you doing your work. We almost don't care how you do it because it's a tiny percentage of the time. To keep the customers happy, we got to take this out and we've got to take this out , and that's what we're going to worry about.

And in a way, the same goes with medical care. A lot of the customer dissatisfaction comes from this kind of stuff. If my son gets injured, I take him to the hospital. I was absolutely delighted with the 45 seconds of care that he received in our nine-hour visit. So I was not going to tell the old male nurse who was really good at stitches how to do his job. I was delighted with his job.

But there was a bunch of other processes involved in that particular experience that could have used improvement, which gets to the issue of pulling value. I was the customer there. I didn't really perceive value pull in that experience, although I've had some where I did.

So what does this mean? This is a kind of a difficult concept, and it exists on a couple of scales. Sometimes the easiest way to think about it is to think of its opposite. A push system is an old-fashioned mass production system where what you're trying to do is optimize the productivity of each step.

What that means is we set up our machine, or we set up our process, and we push a lot of material through it because that is the most efficient way to do most things is to set something up and then just bang stuff through it. And people sort of intuitively understand that. There was a question of why don't we just automate it? Well, to automate something, you have to set up a process, buy expensive equipment, and then when you're all done after doing all that prep work, voom, the shoes just fly out the end, and you can build huge piles of them.

But then the question is, do people want them? Are they good? Is there quality issues? Is there issues if you want to change the style, how hard is that to do? So that's a push system.

A pull system is kind of the conceptual opposite of that. Stuff only happens if the customers want it, and it happens, hopefully, quickly enough that the customer is satisfied by the process. So it's triggered by the customer.

And that is what New Balance is really striving for they had a three-day turnaround. So the shoe store ordered shoes, and in three days the shoes were manufactured all the way from raw materials and sent to the shoe store. This both results in and necessitates a smooth flow with relatively modest batches and relatively small wait time, or it doesn't work. So as sort of an ideal, it's worth trying for. And inherently there's very little waste in that kind of system.

Trouble is, of course, that's relatively hard to do. So let's think about what we need to do to do a pull system like we saw at New Balance. Pretty much requires flow. You don't have to have perfect flow, but if you don't have a system that flows reasonably well, it's very hard to make it a pull system. And you would like to have a fairly predictable cycle time.

Here's a bunch of tools. We're going to get into those in a while. The point, really, with this slide is that to have pull, you need if not all of these, most of them. You have to have a pretty Lean system. And again, we'll get into what those are.

And a pull system starts with the customer, and essentially the signals work backwards through the system. What does that mean? From the customer's point of view, it means that either the cycle time is lower than my expectation for when my product will be delivered or when my service will be delivered. Or there's inventory in the system.

As a for example, I ordered a computer a while ago, that computer right there. And I sort of mentally budgeted a couple weeks. You get the new computer, put the files on it, get used to the system. I ordered it online. And it came in from China in less than 48 hours, less than two days. So to me, that was a pull system. It was way inside my expectations. So as far as it felt, I wanted it and it came. So that's a very nice system.

The system was actually originally invented by Dell Computer. Apple's really good at it. Dell still is, actually, although interestingly, their market has shifted more to servers and industrial uses of computers than consumers. But they were one of the original inventors of essentially ordering something on the web, and then having it built for you in a process that's not really automated, but the process itself creates your computer.

People don't think about the McManus order. It's just you order that computer. It goes into the system. That initiates the production of the computer, which goes very fast so it can ship the same day. And then they have a really nice supply chain operation so it can come all the way from China in about 24 hours, and you get your computer.

This has become pretty standard for a lot of consumer products. So the bar has gone up. People are no longer mega impressed by this, but it's actually pretty impressive that people can do that on the customer end.

A very useful concept when thinking about pull is takt time. If I want one, I'm really thinking about what's the cycle time I expect? I want a computer inside of a week, so if I get it in two days, I'm delighted. But if I'm Dell's current customers-- they're people like Google-- and I want 100,000 computers, then what we have to start thinking about is what is the pace at which I want those computers to show up? And that's a really simple calculation, actually, and one that's very much worth doing even in processes that are less predictable than production.

Things like engineering and hospital processes, this is actually very useful to do, which is to just think about what's your available time-- a day, a week, a year, whatever it is-- and what is the customer demand during that time. So if I have a day and I have to see 16 patients, what's my takt time? Eight hour day, 16 patients, half hour. If I'm not seeing a patient every half hour, I'm behind. It's not rocket science, but it's a way of understanding what the customer demand is, and if I hope to have anything resembling a pull system, what kind of time constraints I have to stay within.

So that's a very simple calculation here, which is basically the same one that we did for our medical example. This is for 40 orders across a year of 235 working days. Same idea. This is basically what is the pace at which we need to do work to satisfy the customer need?

AUDIENCE: So that's presuming that this is like on average. But what if all 40 orders came in on the same day?

AUDIENCE: Right. Yeah, that's right. Takt time is an average. The issue of irregularity we're going to explore a little later in the class. It definitely makes things harder. On the other hand, if you're dead on average, then no amount of variation is going to help you. Variation almost never helps you. So you start here. But yeah, there is that issue of what if-- sorry for the aside, but I was visiting Walmart, one of their distribution centers. They have an awesome supply chain. They're very, very good at what they do.

They had this enormous warehouse in the middle of nowhere with about a cubic mile of lawn mowers in it. I exaggerate a little bit, but I think it was a good chunk of a mile long, only maybe 100 feet wide, and as many lawn mowers as you could stack before they started crushing each other. Not very Lean, right? But that's because everyone wants a lawn mower when?

Yeah, like May, right? So sometimes you're just screwed. But on the other hand, the reason that they stack the lawn mowers up into the big cube is because the lawn mower factory was working to takt. They just figured out, over the whole year, how many lawn mowers they did. And they were just banging them out real efficiently at that rate, and they just decided that the best thing to do, although they weren't happy about it, was to pile them up and sell them all in May. So the takt still, actually, over a year, made sense. Just happened that they had to keep them all until May.

OK. So what's our takt time at our hot dog stand? If we had 50 customers, what would our takt time be? Somebody that's got a calculator they can bang that out? Four hours, which is some number of minutes, which is some number of seconds. 12.5 customers per hour. So how many hours per customer? And let's try to express that in seconds. Let's see. We got 240 minutes. So we got about four and 1/2 minutes. How many seconds is that? Can somebody multiply that by 60? 280 seconds.

All right. And if we wanted 75 customers, we'd need even less 192. OK. That's for 50. 192. 475 So we've computed a takt time and a cycle time for our hot dog stand. And first order doesn't look good. Our cycle time is longer than our takt time. But that's a little deceptive because there's two workers. It takes one hot dog, this one to order of two hot dogs, about this many seconds to get through the system. But it's trading off between two workers. So we can't just directly compare those. Still, it probably makes us a little nervous that our takt time, the sort of average time we have to hit, is considerably lower than the amount of time it actually takes.

We'll save that thought for a little later and move on to the thought of balanced work. Actually, again, in this example it's pretty easy. We've got two workers. If their work is perfectly balanced, they're kind of doing half the work each. Is that the case? Don't know.

OK. So we have this example of a product that needs to be delivered every six days. If it takes 30 days to build, how can we do it? Well, one thing we could do is split the job the job up into five pieces. And then they should take six days each. So that would work.

And as unit one goes into the production there, it takes a couple of days to get things started. Well, [INAUDIBLE] has taken off by itself. I don't have to push the button anymore. Every six days a unit comes out, so we're making our takt time, even though our cycle time is longer. But we have five steps, five workers, five units of work.

And they're balanced. They take the same. If one of those processes took eight days, would that work? No. It would take eight days. get The takt time would basically go to eight days.

So again, not rocket science, fairly simple. But if we look at existing processes, if we're plotting this out, it's easy. If we look at existing processes, they're very rarely balanced. There usually is a bottleneck process or a problem where one step takes longer than some of the other ones. So balance is a key concept.

Standard work. We've talked quite a lot about the fact that if we can't standardize work, then it's very difficult to improve it. Single piece flow is a key concept that's kind of integral to the idea of pull, that we're processing one unit at a time, just like that illustration, through all the steps to completion. That's kind of an ideal. It works great on a PowerPoint. Things are going one step at a time. No inventory. That's great.

In practice it's sort of an ideal that we shoot towards. We try to keep our batches small. We try to make processes, when we can, line up so that the flow is single piece. That's kind of the opposite, again, of a batch and queue, where we make big batches of stuff and then it waits until the next step is ready to take it.

This is a key conceptual tool for any kind of pull process. It's called a manufacturing cell. And we actually saw these in action at New Balance. The classic cell is actually U-shaped. People actually arrange the stuff in a U on the factory floor because then the in and out are basically in the same place. Makes moving stuff around easier.

There is even interesting rules about whether they should go clockwise or counterclockwise depending on whether you're right-handed or left-handed. If you want to get into the ergonometrics you can get very clever. But the basic idea is, OK, if we have some tasks that can be balanced, that can be made to take about the same time and that aren't dependent on a big batch machine like those cutters, then we can line them up, balance them so they take about the same time, and then put in a very interesting rule.

Instead of a big, complicated scheduling system, we're going to say don't work unless the downstream process needs you to. And you can tell whether it needs you to-- you don't even have to ask-- by the fact that their inventory bin is empty. So very simple rule.

So in practice, OK, everybody has inventory, nobody works until the next process in line, the internal or external customer, takes product away from here. Now task four starts to work. To do that, they start using their inventory, which means three starts working, which means two starts working, which means one starts working. So now everybody's working.

Oh, and of course, now we're out here. So we have to go ask our internal or external supplier for more parts, for more stuff. If everybody takes exactly the same amount of time, my next click would get us back to the beginning. Everything would go back to everybody having work in front of them. So they stop working. No inventory. Direct customer pull. It's just triggered by the customer taking the item out of the inventory of one at the end.

In the real world, some tasks, maybe the balance isn't perfect, these tasks finish first. They notice now that there is inventory sitting there because this task is not ready to take it, so they're finished. They stop working. That seems inefficient, but what good does it do if they keep working? What happens if they keep working?

AUDIENCE: [INAUDIBLE]

PROFESSOR: Yeah, it just creates more inventory. We can just pile up inventory here. That would be a waste of overproduction. So that's very simple, but this is very practical in the manufacturing system. And conceptually, you can use it for things like engineering work. Rapid drawing release, people have set up cells.

That horrible value stream we saw at the very beginning with all the lines going everywhere, well, that was to get one drawing out. So if you just line the engineers up like this, makes as much sense ever as anything else. It may not be perfectly efficient from the engineer's point of view, but it minimizes, without any complicated control system, the time the product spends in the system. And that's the advantage of a pull system.

Another example of pull as a kanban system. We talked about that a little bit before. Essentially, same rule. Appearance of a kanban bin means that the downstream process wants parts. Kanban card or bin, some kind of signal. The difference here is that we're no longer in a cell. We're no longer right next to the other process. So we need some kind of signal.

Now it could be a complicated order with legal and pages, or it could be a bin or a card, something simple that we've prearranged that says, I need work. I need you to do work for me. Of course, you have to have standard processes for this. You have to agree what this card means. But it does allow us to control even a fairly complicated system visually, and even if it's geographically or organizationally separated.

Again, a very simple example. If we have a supplier and a manufacturer-- in this case, we have physical bins. In the New Balance video, you saw those plastic bins that everybody was using to move the parts around. It's very real, very direct and physical. If we run out, we send the empty bin to the supplier. They know what that means. It means fill it up. So they work on it and they fill up the bin.

When it's full, shipping department knows that means to take it away. When it shows up, the manufacturer uses it until the bin is empty. Back to the supplier. Self-perpetuating system. Even if these systems are not particularly well-balanced, or even if demand is intermittent, it will operate with no outside interference, no management effort, and minimum inventory.

About the only trick in this is essentially how many bins. If you only have one bin, what's the problem? Yeah. You have to wait, right? You have to wait for the supplier to be finished before you can start working again, which might be OK if it's a low demand product or something.

In this example, we have four, so it kind of continues round and round. Worst thing that can happen here is if there's no demand, four bins worth pile up because the supplier will keep moving until all the are full. So we could pile up four bins. That's probably not horrible unless, of course, they're really expensive things. So there's essentially a design knob on the system, which is how many bins, but that's it. It's very simple. And we can tweak it as necessary by changing the number of bins.

OK. So that's kanban. Kanban itself is kind of a visual control. You see an empty bin, you work. There's other kinds of visual controls that are referred to generically, again, with another Japanese word, the word Andon. Andon is kind of an adjective that means visual control, more or less. And you can have, for example, Andon lights.

Again, in the video, you may have noticed in the background some lights like this. Very standard practice now in manufacturing to have a little light tower like that. Red means the machine is broken or there's some serious problem. It needs attention. Green means it's going fine. Yellow means maybe were behind a little bit. It allows you to just look across the factory floor, see the state. If everything's green, it's dandy. If there's red stuff, you got to go fix it. If there's yellows, that tells you what to worry about. It's only really useful if you do something about it, though. It's part of an active management system.

Another one is the Andon cord. This is the famous counterintuitive Japanese practice of basically having a cord in front of every employee that they can pull that stops the entire factory. This is very scary, even to this day, to North American managers because any disgruntled person can pull the cord and stop the entire factory. What's that about?

But of course, the way they use that is to draw attention to a serious problem. If a quality problem is happening, the parts don't fit, that's unacceptable at a high quality production operation. So they stop the line because if they don't, that defective part is going to continue down the line, get more parts piled on top of it until you have, essentially, a defective car. So a washer or whatever is turned into a big problem. It's actually better to stop and fix it.

It also provides a lot of motivation. Everybody comes over and fixes it right away because the line is stopped. So the team leader, engineers, whoever needs to come on over and solve the problem. That's the Andon cord concept.

Medical example. Virginia Mason Medical Center. They have essentially a policy that says that any of their 5,000 employees can-- they don't exactly stop seeing patients-- but all attention is paid to this person if they declare it an Andon cord action. If there is a patient safety issue that needs to be dealt with immediately, they can get as much attention as they need. And this happens quite a bit.

But it has also surfaced a lot of problems. And the real key here, by the way, is not that this is a very good, quick problem-solving method, because it isn't-- it stops the line. It could be potentially very expensive over something very small-- but that it surface problems. If you have a problem of this magnitude, you don't want to see it again. So it surfaces the problem and allows people to pay attention to it, find the root cause, make it go away for good.

OK. Final step, pursuing perfection. This is all about not quitting. There's always more ways to eliminate. There's always ways you can do things better. There's always ways you can get the employees more involved. So it's a continuous process. And we'll be talking about that more later.

Another tool, a final tool for this afternoon, five whys. The eight wastes and the six S's. These are the five whys, not the letter, the word. And the point of the five whys is to keep asking why. The fact that there's a number is actually kind of bad because you may not want to quit at five, and three might be enough. But here's an example.

Possibly apocryphal example about the Jefferson Monument. Why is the Jefferson Monument deteriorating? Because they wash it all the time. Why is it washed all the time? Because it has bird poop on it. Why do they do that? Well, because the birds are eating the spiders. Why are there spiders? Because they're eating gnats. Why are there gnats? Because the lights are on all the time.

Of course, I had somebody at a class a couple of times ago that said, why are the lights on all the time? Because it's in a bad neighborhood.

So maybe five is not the right number. Maybe less is OK. Maybe you need to go deeper. So the five fundamentals kind of work together. Pursuing perfection may send you all the way back to the beginning. This is kind of a strategic view.

The tactics-- and we're going to be talking about this for the rest of the week so I won't dwell on it-- are, in this loop, the Plan, Do, Study, Act loop. So whenever you find something you need to fix, you don't just willy nilly fix it. You go through an ordered process, and it is through a series of these ordered processes that you actually improve your value stream, achieve your flow, push towards pull.

So we've actually gone through a bunch of stuff. Remember that huge chart at the beginning that nobody knew hardly any of the turns on? Well, now you have at least been introduced to all of these, quite a few. I don't know whether you've absorbed all of those. Hopefully at the top level, the concept of process, the concept of thinking about customer value has sunk in, and that some of the thoughts about making value flow, a couple of the simple tools have stuck, particularly-- not on the chart, but always a favorite of mine-- is that you've at least started to appreciate the complexity of what time means in these processes.

And again, we'll be doing a considerable exercise on that starting in just a few minutes. So that's it for now.