Module 2: Process Improvement Projects in Continuous Improvement Programs

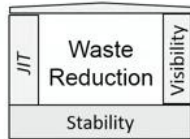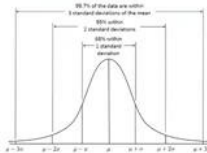## Table of Contents

Lesson 2-1: Roles and Responsibilities

Lesson 2-1.1: Program Management Roles in Six Sigma

We're learning about the infrastructure for continuous improvement. In this session we're going to talk about the roles and responsibilities of different individuals, the people in different positions in organizations and what they do. But before we get to that, let's remind ourselves of the two initiatives that we're focusing on here, Lean and Six Sigma. Lean focuses on waste reduction, whereas Six Sigma focuses on reduction in variation. Lean is about trying to eliminate waste from the point of view of customer, and Six sigma is about trying to reduce variation so that we can get better quality products, better quality goods and services to customers, and have a process that is impeccable in terms of being defect-free. The things that we're going to focus on when we look at continuous improvement infrastructure in general are the roles and responsibilities of people in both of these initiatives. That's what we'll be looking at in this session. Then next we'll get into the idea of strategy deployment. Which is, how do we convert a business strategy to actions that are being taken on the frontlines or process improvement projects that are being undertaken at the front lines. These two topics are obviously connected. The people who are responsible for different things in the organization are going to be responsible for deployment of strategy, for the different parts of strategy deployment. That's how these two aspects of continuous improvement infrastructure are going to be connected. We'll also look at, in lessons later on project selection and specifics. Talk about, some techniques that can be used in order to prioritize projects. How do you select which one to do first and which one should be

second and third priority. Then we'll see how organizations can get started with a Six Sigma or a Lean initiative, through using process improvement projects. Finally, we'll see different kinds of project infrastructure. Using a DMAIC, if you remember thats a, define, measure, analyze, improve control, which is a framework for projects and Six Sigma. We'll also look at an A3 an implementation framework which is used by Toyota, which is popularized by Toyota, but which is used under the Lean initiative. We'll also see some other frameworks as well, that are going to be similar to this. But mainly we'll focus on Six Sigma and Lean, as being frameworks.

EXECUTIVES' SIX SIGMA ROLES AND RESPONSIBILITIES

(Pande et al., 2000)

Executive Leader Champion

Top management

- Provide direction for initiative
- Connect it to business strategy and to organizational culture

Project Champions

Upper middle management

- Participate in project reviews
- Authorize resources
- Remove barriers for project teams

Let's get started with looking at some of the responsibilities of people when there is a Six Sigma implementation, Six Sigma deployment that is being undertaken by an organization. Let's start from the top. First we have the Executive Leader Champion, who's going to be like the CEO. This would be the Jack Welch at GE, who championed the idea of Six Sigma and decided that, that's what they were going to do throughout GE. What is the champion do? The champion provides the resources, that's the main objective, or that's the main role that the champion from top management plays, is given the resources, putting the money where the mouth is. In terms of, we're talking about this initiative, this is what we should be doing. Here are the resources. Here's how you can spend time doing continuous improvement, focusing on getting training for continuous improvement, focusing on doing projects, focusing on data collection. That has to come from the top in terms of a blessing, in terms of where we are going to spend resources in doing these things. The top management also has to take a big role in trying to connect, what is being done in process improvement to business strategy. That's the role of the executives, were the top management. Next, let's move on to the upper middle management, and these would be divisional leaders, if it's a manufacturing company, it could be plant managers. If it's a hospital, it could be different areas, different departments within the hospital. You have the ER, you have the pediatrics department, you have the geriatrics department. There may be different departments there, and each of those would be upper middle management and would be playing the role of project champions in Six Sigma. In Six Sigma, the project champions, their role is to invite projects, to say, here's a problem that we have in our department, in our division, in our plant, in our location, and then they can go to the six-sigma part of the process improvement part of the organization, the infrastructure that's

there of black belts and green belts. We'll talk about next, and tell them, look, here's a problem, can you help us solve it? Can you be the internal consultants essentially, come and help us solve this problem using the methodology. That is Six Sigma, that is what the Six Sigma black belts and green belts would be experts at. You'd be inviting them, as the upper middle management project champion to come and take care of some problems by using Six Sigma methodology. They would also be participating in project reviews, looking at what's going on in the projects. If you're thinking about Six Sigma, you should be thinking about DMAIC, define, measure, analyze, improve, control, as being the five phases of a project. A project champion would be keeping an eye, on the report outs at all of these phases. Seeing after define, what was found and whether that project is something that is worth continuing or if it's getting too big to be one project and needs to be divided up. Those are the things where the project champion has a role to play in, in conjunction with the project leader, who would be the black belt or the green belt, who's actually working on the project. The project champion would have, some say in that, or should have some saying that, rather in terms of being involved, being engaged in the Six Sigma initiative. The project champion, and this is from upper middle management, is also going to play a role in trying to take barriers out when somebody is trying to implement a project. What do we mean by that? Well, if there's a black belt, who needs some support from a different department for carrying out the project. Let's say they need some IT solutions and they don't have people from IT on the team or they're not, or they're finding it hard to get time from IT to get the project done, to get the project going forward, it's the upper middle management who has the authority, who can talk to their counterparts in the IS department, in the Information Technology, Information Systems department and get something done about it. They play, this idea of removing barriers from any obstruction that's being faced by the project leader in terms of moving ahead with the project.

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Lesson 2-1.2: Project Team Members in Six Sigma

SIX SIGMA IMPLEMENTERS' ROLES AND RESPONSIBILITIES

(Pande et al., 2000)

Master Black Belts

Train all other belts and champions

Provide assistance on projects

Update and improve the initiative

Black Belts and Green Belts

Lead projects

Participate in projects

Learn methodology and tools

Take on full time project leadership

Team Members and Process Owners

(Pixabay.com/ClkerFreeVectorImages, 2012)

Next, let's let's take a look at the people who actually do the project. So here six sigma uses these kind of rolls of black belts and green belts, right? We take this from martial arts obviously, and the role of a black belt is to leader project. So in six sigma black belts are people who lead projects. And typically, the distinction between black belts and green belt is the kind of training and the kind of responsibility that they have. So talking about this hierarchy of belts in six sigma, we start with the master black belts. The master black belts are the people who are going to be owning the whole process improvement initiative from the point of view of, what should it be using as a framework for process improvement? Should it be using to make or should it be focusing on something like clean, which would be an alternative process improvement initiative? Or should it be a combination of both? And I don't mean to say that a company should be doing one or the other, but that's how typically companies think about it. They could be focusing on one or the other, or doing a combination of these things. And the master black belt plays a huge role in deciding what is going to be the content of that continuous improvement initiative. What is going to be the training that the black belts and green belts are going to get? Are they going to get trained in six sigma methodology? Are they going to get trained in value stream mapping and lean methodology? Are they going to get trained in both? And that might be the choice that they make. But essentially, the master black belt is making that choice. The master black belt also becomes the go to person. The expert that the black belts and the green belts would go to, the project leaders would go to in case they have difficulty in getting some project done, in case they have difficulty with some kind of statistical

methodology, in case they have difficulty with getting buying from people. So it could be soft skills or analytical skills that black belts and green belts of project leaders might be having difficulty with, and the master black belts are the people that they would go to. So going down this hierarchy of belts, next would be the black belts and the green belts. And I put them both here together because in terms of training, the difference is not much or I should say it depends on which company is doing the training. There might be a substantial difference or very little difference between black belt and green belt training. So black belts conventionally when GE started doing this, when Motorola starting doing this, the idea of black belts was that they were full time project leaders. That they would be people who are taken from within the organization, plucked out of their day to day job. Their line responsibilities, their functional responsibilities, and trained to be project leaders. So they were trained to be internal consultants who would be then leading projects full time. Full time for a period of maybe two years, three years depending on the organization. So they would just be doing projects, and not having any functional line responsibilities toward the organization. And they would do this for two to three years, and then get absorbed back into the organization. The idea being that the company is putting in place experts in every area by doing this training of black belts, having them do full time projects, and then going back and working in their line and functional responsibilities. So that was the idea. But nowadays, that has been tampered with in the sense that black belts are not always full time. They might get trained but be doing projects maybe 20, 5, 30, 50% of the time and the rest of the time, they still have their line and functional responsibilities. Green belts on the other hand conventionally, we're always being talked about in terms of being part time project leaders, part time six sigma experts, part time project leaders experts. And they were trained to do this 25% or 30% of the time, 75% of the time during their day to day responsibilities. And as far as the training is concerned, green belt sometimes get less training than the black belts. They they don't get training in leading teams as much, they don't get that much sophisticated statistics training. If you're talking about a manufacturing organization, they may not get training in design of experiments and more sophisticated statistical analysis methods, while black belts might be getting those. So that's pretty much the difference between black belts and green belts. To summarize what we're talking about here, is master black belts are the people who determine the content of the training and act as consultants. Black belts and green belts are the people who are actually doing the project work, which are leading projects and working on projects. Now green belts could also be simply participating in projects. They don't have to be leading projects, they might be participating in the project and providing input to the black belt to maybe the project leader. And finally at the bottom of this hierarchy, we have the team members in the process owners at the bottom but still very important. These are the people who are going to participate on the six sigma process improvement team, process improvement project and they are going to be the ones will

be collecting the data, providing their input in terms of what might be the root causes of some problem that they're trying to solve. And they might also go back and collect additional data if needed. The objective of this is to get a view from the front lines as well as to create buying. If you don't involve people who are working in the process, you're not going to get buy in because then it will be a black box kind of a result that you're giving them from the project and that's not advisable. So involving people from the front lines, from the process in the project helps. And sometimes, you have people from support processes as well. So if you're doing a project that involves potential solution from facilities which means you're going to have to break some walls and move some machinery, then you might have somebody from that department as well playing a role in the six sigma project. But the idea is that you take people who might have something to do with the project objective, and you put them in the project team. So that's the responsibilities or those are responsibilities under six sigma.

ORGANIZATIONAL STRUCTURE

Just putting this in terms of an organizational chart. So here, you can actually see two parallel organizational charts if we can call them that.

ORGANIZATIONAL STRUCTURE

One is the the traditional organizational chart, which is the executive leader and then the divisional managers under them which is the middle management, and then the front line people, the process owners, and the people working on the process.

ORGANIZATIONAL STRUCTURE

Master
Black Belt

Project Leader
Black Belt

Project Team:

Green Belt(s)
Process and Support Associates

On the right side of the slide, you have the six sigma organization. The Master black belt under whom is the black belt and under whom might be green belts.

ORGANIZATIONAL STRUCTURE

So the idea being that the master black belt is somebody who works in six sigma full time, but the project leader is somebody who is temporarily working under six sigma full time, but is also working to help the project sponsor who is going to be the divisional manager or the department leader from that organization. Next you have on the right side, the project team. This is made up of green belt and people who are going to be on the project team from the process. And just to the left of that, you have the the process owner and the process associates. So what are those? So the process owner is somebody who is going to be responsible for taking whatever is learned from a particular project, and implementing it on a day to day basis. Now you have to remember that a project team will come and do their job. They'll do the project over a period of so many months, maybe three months, four months. They finished the project and they move on. And they move on to other projects. They hand over their suggestions, their implementation suggestions to people who are working on the process. So you need the process owner to be bought into whatever changes there are. So that's the role of the process owner. Place is at the end of the demaic cycle when we go through define, measure, analyze, improve control. At the control face, the process owner takes over the changes and starts implementing them in conjunction with the process associates, in conjunction with the people who are actually working on the process. So these are the roles and responsibilities. Now what you notice is in six sigma, or what you should have noticed is that they are very structured roles and responsibilities when you're talking about this process improvement initiative. The six sigma process improvement initiative.

Lesson 2-1.3: Challenges in Deploying Lean and Six Sigma

IN-VIDEO QUESTION

What challenges do you anticipate for a large organization deploying a continuous improvement initiative such as Lean, or Six Sigma or Lean Sigma?

(flickr.com/taymazvalley, 2010)

Now let's take these ideas and think about it for a minute. If you think about a company that is wanting to implement a process improvement initiative today, this may be a large organization, and if you can think about what kind of challenges that they would face when they are trying to implement something like what we just talked about, a Lean, or a Six Sigma initiative, or even a combination initiative, or any kind of continuous improvement initiative, what kind of challenges would a company face when they're trying to implement something like this? Take a minute and think about that.

**IN-VIDEO INSIGHTS
COMMON CHALLENGES OF C.I.
DEPLOYMENT**

Push-back for "black belts"

Lack of champions for projects

Skepticism of employees

Resources from upper management

Support from middle management

Desire for and acceptance of change

Fatigue from previous initiatives

Here are some of the points that I came up with in terms of challenges for a company trying to implement a process improvement initiative like Lean and Six Sigma or Lean Sigma. The first one that I have here is pushback for Black Belts. What I mean by that is that when you have consultants who are trying to solve a problem for people working in the front lines that can create some pushback from the point of view of, I know what I'm doing on my process, they don't need to come and tell me what to do. It's the same problem that we have when there are people from outside coming and telling people what to do on their process, on their tasks. That there may be some push-back in terms of they don't really understand what the context is, they don't really understand what the problem is here. I say Black Belts here, but this can happen with any kind of project leadership. In fact, if you think about this particular point, sometimes it's even better to get an external consultant because then it's an expert from outside that's coming and telling us. If it's not invented in that particular organization, it's better when it's coming from outside in some ways. There are disadvantages to that as well. It's not always going to be better to do that. But this is a challenge that any continuous improvement initiative will face is the idea of experts trying to tell people what to do. Next is a lack of champions for projects. Middle management might be hesitant to go out and do process improvement and get involved with something like this. It takes time, it takes energy from middle management to do that. They may not be interested based on the incentives that they have. They might not be interested in doing something like this. It might not be very beneficial for them to do this when they're thinking about their own progress in the organization or even retirement from the organization. They might not be very bought into the idea. Skepticism from employees. Employees get skeptical when you have all these continuous improvement initiatives that are talking about different

frameworks, the idea of a PDCA; a plan-do-check-act, the idea of a DMAIC. They might just get very skeptical about this and say, "Here we go again," in terms of trying to do some improvement. It's not really truly trying to make improvement, It's only the organization trying to show something about making improvements. Unless the frontline believes that top management and middle management are really engaged in this and are in it for the true benefit of the employees as well as the organization, they're not going to get bought into it. Resources from upper management. Sometimes upper management fails to provide adequate resources, adequate extra time, adequate finances for conducting process improvement projects, and that can be a hindrance. It needs a commitment, it needs a day-to-day thinking about process improvement at all levels. Upper management has to be engaged in it and be thinking about it and talking about it, communicating it to everyone on the front lines. They're really bought into this idea that continuous improvement lingo; the language, should flow into the annual report that's coming out or any kind of event that the CEO is involved with, the top management and upper middle managers is involved with, they should be bringing that out. We're not just talking about resources in terms of putting money, but also showing that they are really bought into the idea. The best way to do that for upper management is to actually practice what they are preaching. Use PDCA in the way that they make their decisions at those higher levels. Support from middle management. Change is always hard for middle management, and especially when the idea is giving up control. Trying to get front-line people involved in that change is something that middle management might find it hard and they might find it hard not just from the point of view of giving up their authority, but they might find it very risky. It's what if I let the people in the front lines come up with ideas and it doesn't work out? How is that going to play out? That's something that upper management and middle management has to get over the idea of giving up control. Bringing in a little bit of humility in saying that maybe their ideas out there that I cannot get on my own, so I should involve frontline in making the process improvement. The final point that I have in terms of the challenge for process improvement or continuous improvement initiatives, is the idea of this flavor of the month continuous improvement initiative. We keep coming up, when I say we all of the different industries, all of the different in the environments out there, we have so many different process improvement initiatives; total quality management, business process re-engineering, Lean, Six Sigma, some people focus on the balanced scorecard, and the Shingo Model. There are many different continuous improvement initiatives. If you try to unpeel the onion of each of these initiatives at the core, they are all getting at very similar ideas. But what happens is, when you try to implement all of these, just because it's fashionable, just because GE is implementing Six Sigma, we should go ahead and do it. We should call our people Black Belts and Green Belts, or we should call them [inaudible]. We should be talking about going to the Gemba because that's a Japanese word for going to where the work is actually being done, that's going to create what we

already referred to as skepticism from employees, but also create some fatigue from the process improvement initiative. It becomes a challenge when you are trying to revive process improvement based on a new initiative, trying to put in place a new lingo. You have all this history of other process improvement initiatives that needs to be gotten over before they can buy into the idea, before people in the company and the organization can buy into the idea of process improvement. But nevertheless, it's evidence enough that process improvement initiatives have been around, that they must be contributing something positive to organizations. That's why we are learning about how to implement continuous improvement here.

Lesson 2-2: Project Selection and Execution

Lesson 2-2.1: Scoring Projects for Prioritization

PARETO PRIORITY INDEX FOR SCORING PROJECTS

(Juran and Gryna, 1993)

$$PPI = \frac{(\text{Projected saving} \times \text{Estimated probability of success})}{(\text{Total project cost} \times \text{Expected time to completion})}$$

So in this session we're going to look at some project selection methods as well as look at or get introduced to the idea of different projects execution frameworks. And then we'll look at some of those frameworks in detail later. So here you have a really simple way of selecting projects or scoring projects for selection. So it is what is called the Peredo Priority Index. And the idea here is that you're doing a benefit to cost ratio. So you're saying in the numerator of this ratio, you have projects savings, these could be in dollars, these could be in euros, These could be in pounds. And then you're multiplying that by the estimated probability of success. So this is how difficult or how easy it's going to be for this project to be successful. What do you expect? The chances are that this project will be successful will be able to achieve what is trying to achieve. So that's in the numerator, the benefits that you're going to get from the project multiplied by the chance that this project is going to succeed it's going to work. In the denominator, what you have over here is the total project cost. The total project cost is the the cost of the time that you're putting in the cost of the resources that you're putting in into the total project cost. And then you also have the expected time to completion, which is how long will it be before this project completely gets done. And that is something that you're putting in the denominator as a different cost. So we're getting a benefit to cost ratio and just to take a look at a quick example of what something like this would look like.

**IN-VIDEO QUESTION
LET'S DO THE NUMBERS**

| Project	Savings (NPV)	Probability of Success	Project cost	Project duration	PPI
Packaging reduction	£1,750,000	50%	£150,000	.75 years	
Changeover reduction	£2,500,000	50%	£300,000	1 year	

(Dugdale, 2010)

It's a quick and dirty way of scoring a project. But here you have an example or two examples of two different projects. The first one is reduction of packaging, which gives this particular company a benefit of £1,750,000, the probability of success of 50%. The second one is changeover reductions. The second potential project that this company is considering is reduction of change over in some manufacturing process. The cost, the savings of that excuse me, is 2.5 million. So potential savings from that are 2.5 million. The probability of success is the same at 50%. So just on the basis of this, you can see that the savings for the changeover reduction are much higher. When you look at the costs, you can see that the cost for the packaging reduction are only 150,000 and the project duration is 0.75 years or nine months. So we're talking about a nine month time before this project will get done before it can be implemented before the results can be implemented. Whereas for the changeover reduction, we're talking about duration of one year. So that's the time that it will take before the results can be implemented. Now based on this, you can compute the the pareto of priority

IN-VIDEO QUESTION COMPUTATIONS

Project	Savings (NPV)	Probability of Success	Project cost	Project duration	PPI
Packaging reduction	£1,750,000	50%	£150,000	.75 years	7.78
Changeover reduction	£2,500,000	50%	£300,000	1 year	4.17
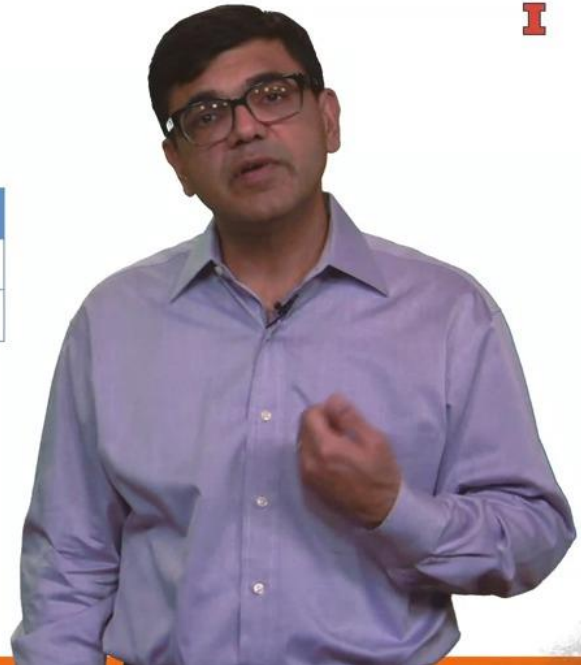
index for these two projects and what you'll find is that for the first one it's much higher at 7.78 than the second, which is 4.17. So like I said, quick and dirty way of saying. Well, the first one is the one that on a benefit cost ratio basis we should be considering before we look at the second one, which is a change of a reduction mark. Now, what you'll notice about this particular calculation, these particular calculations is we use years 0.75 years in one year, we could have used nine months and and 12 months, right. That's the calculation that we could have done based on that and we would have got a different number for the actual ratio that we're getting for both of them. We would have got different numbers for each of these calculations. And that doesn't matter because it would still give you a relative comparison between the first project of packaging reduction and second project of change of a reduction. So as long as you kept the same units, it wouldn't matter because it would give you the same type of result as far as what you're trying to see which is which project to do first. So this is like I said quick and dirty way of figuring out which project to do first.

PROJECT POTENTIAL ON MULTIPLE CRITERIA

Criteria	Low = 1 to High = 5
Importance to customer	
Ease of implementation (Opposite of cost)	
Likelihood of success	
Reduction in costs	
Benefit to other processes	
Total project priority	Product of 5 scores

Initial scores may get updated as data becomes available

Second let's look at a little more involved methods. So it's a slightly more involved method in the sense that. It's looking at multiple criteria for each projects and asking people who are informed about these projects to score these projects on those criteria. So here in this example, what I've given you is our five criteria. So the first one is importance to the customer. Second one is ease of implementation and this is the opposite of costs. So if the cost is very high, the ease of implementation is very low, so we're essentially scoring it from low being not very good to high being very good. So that's the way we're thinking about that scale and that's something to keep in mind when you have multiple items in a scale that they should all be going in the same direction. They should either be all higher numbers being good things or lower numbers being good things and you can choose one or the other, as long as you know what you're trying to calculate there. So going back to the list, you have importance to customer, ease of implementation, you have the likelihood of success. Again, low being not very good. High being very good reduction and costs low being very good, not very good and high being very good and same for Benefits to other processes. So you essentially have here five different criteria on which people who know about this project are going to score. And you might have multiple people scoring it and getting an average or something like that if that's how you want to implement this. The notion of getting a product of these five scores, why is it a product and why is it not a some? So the indexes is based on a product of these five scores and you can try to compare what would happen when you do an addition versus a multiplication to see what's going on. The idea of multiplication is that not having one of these criteria at all is being penalized much more when you're doing a multiplication versus when you're doing an addition simple addition.. And also there's when you have a lot of these criteria, you're getting an

interaction effect, you're getting a multiplication of jump on having multiple of these criteria at high levels. So that's the idea of the product of five scores. And like I said, the scoring of this can be done in different ways. It might be based on experts, it might be based on a single person. And as I note over here, it could be also something that gets updated as you get closer to getting more information. As you get more information as you get closer to making the decision about what projects you might be able to update some of this data and get a better estimate of what the score would be next.

WEIGHTED CRITERIA PROJECT PRIORITIZATION (HOSPITAL EXAMPLE)

Strategic Objectives			Potential Projects Relationship Strength: 0 = none, 1 = little, 3 = moderate, 9 = Extremely high			
			Emergency Department Wait Time Project	Payment Cycle Time Project	Employee Morale Project	Inventory Management Project
Safer Environment for patients and staff	W E I G H T S	.35	3	0	9	3
Best place to care for health care professionals		.35	1	1	9	3
Become preferred choice for care (Increase mkt. share)		.15	1	3	9	3
Reduce variability and waste in processes		.15	9	3	1	9
Weighted Average Scores for Projects			=.35x3 + .35x1 + .15x1 + .15x9 = 2.9	1.25	7.8	3.9

Let's look at an even more involved kind of a matrix for selecting projects for scoring projects for selection. So what do we have in the stable over here? On the left side, the great area are the strategic objectives? This is what has come from strategic deployment. And what you see over here is this is an example of a hospital and it has four stated strategic objectives. The first objective is the hospital wants to be a safer environment for patients and staff. The second objective is it wants to be the best place to care for health care professionals. The third is becoming the preferred choice for care, which is they want to increase their market share in the area. And the fourth one is reducing the variability and waste and processes. So these are the four strategic objectives of the company or the hospital has come up with and this may be from their strategy, deployment, exercise or from any other kind of strategic deployment process. What you also have within this gray area are weights for each of these objectives. So what you have is each of these objectives are scored at as the first two objectives being much more important than the third and the fourth objectives. So you see the weights adding up to 1 of 0.35 for the first two objectives and in 0.15 for the third and the fourth objectives and they should add up to one because you're saying. If you had all these four objectives are the equal or are they going to be how are they going to be scored in terms of importance relative to each other. That's what this is showing. Now, moving on from what you got from strategic objectives, what you have in the horizontal on top are the different projects that are being considered. So the first project is an emergency department wait time project trying to reduce the wait time in the emergency department of a hospital. The second one is the payment cycle time project. The third one is the employee morale project in the fourth one is inventory management project. Now the way these are being scored in the matrix, you have the key right on top of that

horizontal, are that you are talking about a relation to the strength of 0 when you're saying that. Doing a particular objective, doing a particular project will have absolutely no impact on a strategic objective. Next you have a relationship strength number of 1, when you say that there is going to be little impact when we do this project on a particular strategic objective. And next you have a number three which says is moderate impact and finally nine, which says there's going to be a very high impact on a particular strategic objective from doing this particular project. So you can see the scoring being done and again this might be done by one person or a team that comes to a consensus on the scoring. Or we take the average of the scores that multiple people have provided for this. But the idea is that they're scoring the relationship of each project with each strategic objective. Now, once you have all this data, once you have all this information, what you can do is for each project, you can calculate the sum product. You can take the weight of each of the strategic objectives and use that to get a weighted average of the scores that you got on the relationship matrix. Right, so you have for the first one, it's shown as to how it was calculated but it works out to 2.9. For the second project, it's 1.25, for the third project 7.8 and the 4th project 3.9. So here you get a nice hierarchy of which projects are more important based on these criteria. And the way we have done this or the way you've done this is you have involved the strategic objectives, you've taken that into the picture directly. You've codified how each project is going to affect the strategic objective, and then you've taken that into account and coming up with these scores. So, this is a useful matrix when you're thinking about multiple objectives and multiple objectives that have different weights that have different degrees of importance relative to each other.

Lesson 2-2.2: Connecting Project Objectives to Execution

X MATRIX

(Jackson, 2006)

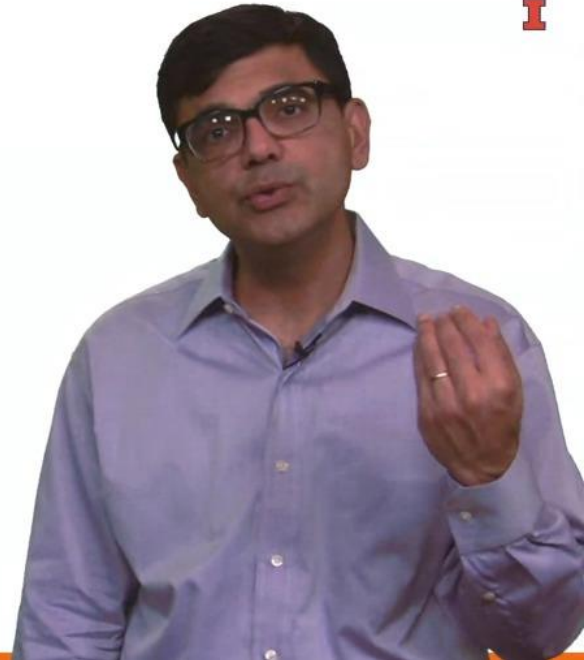Based on codifying relationships between four groups of items
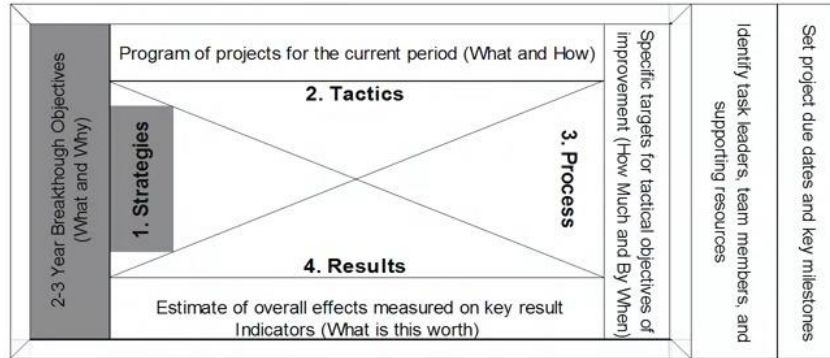
- Strategies
- Tactics
- Process
- Results

Provides explicit connection between project objectives and strategy

(Pixabay.com/ClkerFreeVectorImages, 2012)

So far we've looked at some ways of selecting projects, of prioritizing among different projects which one we should do first and which one we should give less priority to. Next, we're moving on to the idea of taking project selection and combining it with project execution. The X-Matrix is one that is used as part of Hoshin Kanri, as part of strategy deployment. It's used in order to take the idea of project prioritization based on strategic objectives and connect it to the execution of the project. How this is used in companies that are doing projects is for every project they have to have in X-Matrix, which keeps an eye, which keeps track of what is being attempted in that project and what is being achieved in that project and how that ties into different things. So the x has at its four different areas, different things that you are looking at on a continuous basis. The four areas are strategies, tactics, process, and results. So you can see just from these four areas that it is becoming very precise, it is becoming very specific on how these things are going to get connected through projects execution. How the project execution is going to lead to the strategic objectives of the company.

DEVELOP LONG TERM GOALS

To give you a quick overview of this method, it's a pretty involved method using this x matrix. But the left side of this is the strategic objectives, the strategies that the company has and these are fixed on a two to three-year basis. These are objectives that the company is trying to achieve. These are, what is the company trying to achieve and why are they trying to achieve that?

DEVELOP STRATEGIC PLANS
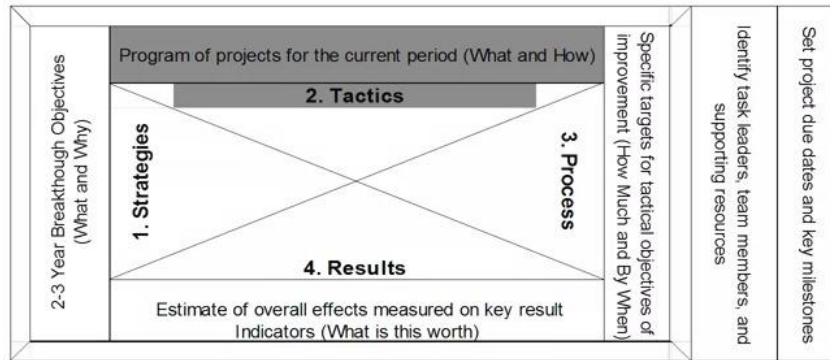
Next, you have the tactics and these are programs of multiple projects for the next six months, so the next one year, it could be the next quarter, the next six months, the next one year. If these are our strategic objectives that we've determined on the left side, how are we going to use the tactics of different program of projects in order to achieve those strategic objectives? What you can have at the corners of this rectangle, at each of the corners of this rectangle is, you can basically put in correlation matrices of sorts saying, how does this connect? Is this a positive correlation? Is it a negative correlation? Is it going to be something that is going to actually hurt a strategy or actually going to help a strategy. So those are the kinds of things that you can add in terms of information for each project, you can have that kind of information as well. Moving on to the four main areas of the X-Matrix here, we have the third area,

ESTABLISH CRITICAL MILESTONES
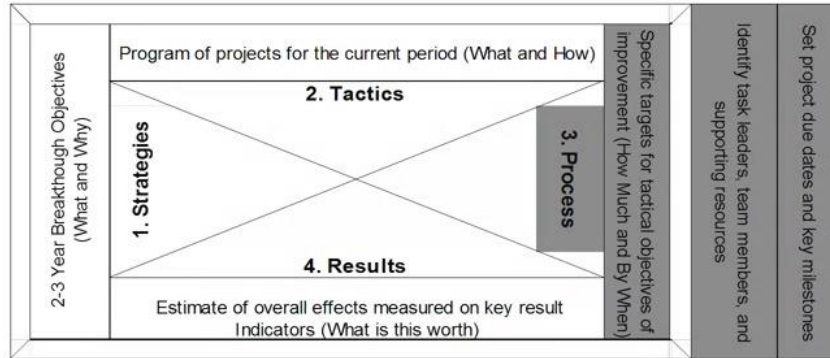
which is where the actual projects are going to get done. This is selecting the targets for the projects. What you can see is there are two columns here which are focusing on assigning responsibilities for achieving those targets from the project. It's not just saying this is what we are trying to do from this project, it is assigning responsibilities in terms of who is in charge of achieving what from this project and by when. So the two columns are who is in charge and by when, what are the due dates and what are the milestones by which this will get done.

CONNECT RESULTS TO STRATEGIES
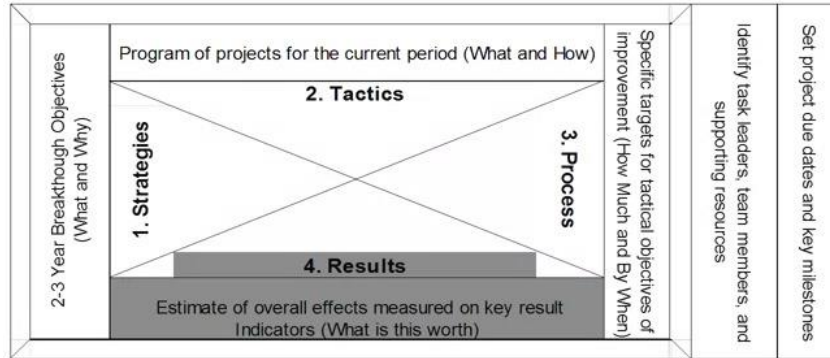
Finally, for the fourth aspect of the X-Matrix, you have the results, the metrics that will tell us what this project has been able to achieve. What have we been able to contribute to the top line or the bottom line from this particular project. The X-Matrix, as you can see, is a very explicit matrix, it's taking a lot of information and combining it into this notion of connecting things at the front line with the top line strategy. What you can also see is that each of the parts of this matrix is going to have a different timeline associated with it. What we mean by that is that the strategies are going to get locked in for a longer period of time. Next we'll come tactics and next will come the process improvement projects. Finally you have the results which are telling you how all of these things are getting connected.

A3 FRAMEWORK

(Shook, 2008, 2009)
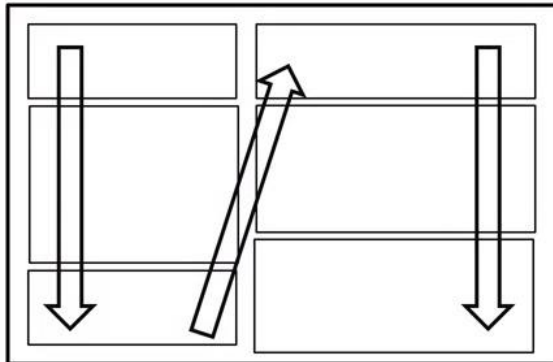
Name comes from paper size

11" * 17"

Contains entire plan for problem solving

Meant to tell a story based on PDCA (or even DMAIC)

Particularly useful for rapid improvement projects

Another technique that is popular mainly with companies that are implementing Lean, although the lines are getting blurred between Lean and Six Sigma implementing companies is the idea of the A3. Now the A3 is simply a paper size. It is a paper size of 11 inches by 17 inches. That's where the name A3 comes from. What does the idea of an A3? The idea of an A3 is to get away from having lengthy presentations, lengthy meetings where people explain what they are trying to do with the project. People explain what they have been able to do with the project, but rather to tell the story on a single piece of paper. So it's 11 by 17 piece of paper that tells the story of the whole project, that tells the story of the entire plan for the project and what was achieved. So it's a living document while the project is being done in the sense that you start the A3 with what are the objectives we're trying to achieve. Then you have everything about that project being summarized on that single sheet of paper. Toyota has used this to a high degree of success in terms of not wasting time on presentations, not wasting time on meetings when things can be looked at from a single piece of paper structure of the A3 framework.

A3 CONTENT AREAS

Theme

Problem statement and current state

Target statement (or future state)

PDCA or similar process (e.g., DMAIC)

Analysis

Proposed solution with timeline

Date and reporting unit or individual

Pictures such as photos, flowcharts, value stream maps, and graphs preferred

What are the different contents? So you have the theme, which is the main idea of the A3. You have the problem statement and the current state. What we mean by current state is, what is the performance of the process? Currently, you have the future state, which is what is the planned performance of the project. Then you have a process. It could be PDCA. If you're talking to a company that's implementing Lean, they're going to be talking about PDCA, but you could also use to make their, again, the idea is to have a project implementation framework that you're using. So you could use DMAIC there and say, "This is what we were trying to achieve in terms of the objectives. These are the different phases of that project and what we're trying to do in each of those phases." You could have analysis that is being shown in their, you could have a Pareto chart showing what are the problem areas. You could have a correlation matrix that is talking about different things. So again, you see that the lines between Lean and Six Sigma process improvement are being blurred here. Because you could have any kind of statistical analysis that is being represented on an A3 as well. So the idea is not to separate Lean and Six Sigma. Say that you use whatever tool is appropriate at that particular time. So in an A3, you might have some statistical analysis that is being shown. What's important to have a timeline for the proposed solution and then reporting units or who is going to get those things done. So this is similar to going back to the X-Matrix, which is saying that you have to have an action plan and you have to have a responsibilities for that action plan. Who is going to achieve what by what date has to be specified on the A3. When we see these being used at companies like Toyota, they like to use a lot of pictures, flow charts, diagrams that are showing. Here's the problem, here's what we're trying to do. Here's the defect that we're trying to fix. There will be pictures on the A3 charts that are showing, a picture of a peculiar defect or a defect that

has been found commonly in a product, and then how that defect is being looked at and how that defect is being improved. They'll be information on that, on the A3 as well. That's the structure of A3s for you.

IDEA OF A3S

Document how work happens

Keep process improvement close to place of work (gemba)

Involve people doing the work

Communicate the story at a glance

What is the underlying idea of the A3? Why this single document, why this focus on trying to fit everything into 11 by 17, other than not having this lengthy presentation? The idea is that you are keeping the improvement work close to where it's actually being done. So it's not that we're going to meet in a board room and do a presentation. In fact, we're going to go to the Gemba. The Japanese word for workplace is the Gemba. So you're going to the Gemba to the front line and you're doing the improvement there. It's a piece of paper that you can take to the shop floor or where the service is being delivered and talk about the improvement there instead of having to meet in a boardroom. It involves people in doing the work because it's portable, you can take it and talk to people. It uses very simple language, so it's good at communicating. Again, lots of pictures, lots of photographs. So it's easy to communicate this to the people who are actually involved in the process and everybody else. It's a very popular tool, although it's a very simple idea, it's a very popular tool when you're talking about process improvement and quick process improvement. Not having to wait for a project to get completed before implementing it and things of that nature.

Lesson 2-2.3: Project Implementation Frameworks

PROJECT IMPLEMENTATION FRAMEWORKS

Six Sigma DMAIC and Design for Six Sigma

(Pande et al., 2000, 2005)

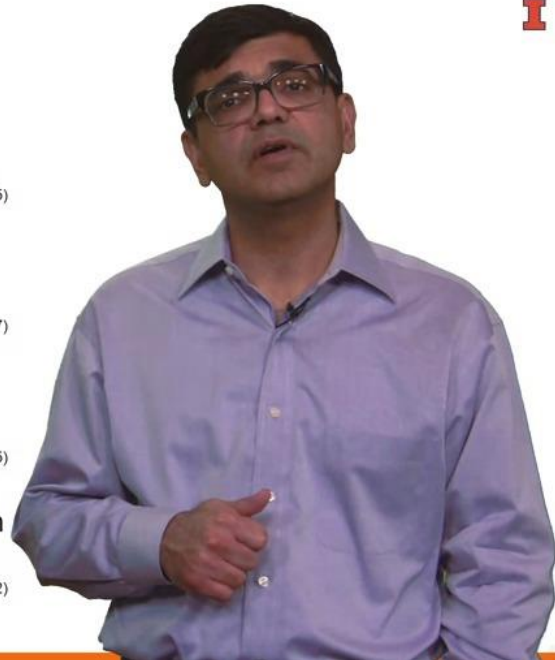Rapid improvement events (Kaizen blitzes)

(Martin and Osterling, 2007)

Daily and weekly huddles

(Imai, 2012; Provost et al., 2015)

GE Work-Out sessions and Change Acceleration Process (CAP)

(Tichy, 2004; Ulrich et al., 2002)

Let's take a look at a few implementation frameworks. The A3 is one way of implementing a project, a process improvement project, but then we also have under Six Sigma, the idea of DMAIC, the idea of define, measure, analyze, improve, control, different toll gates or specific toll gates at each of these stages, and by toll gates, we mean we pay the toll at each of these gates. We have a report out, we have a meeting, we have a presentation that talks about what was seen at the define phase, and typically how these are done in companies is that you don't do this for a single project. You have a fixed meeting date every week, or every two weeks, where all the projects and whatever stage that they at, are able to come in and present whether they are at the define stage or the measure stage. But that's an implementation framework that's used for process improvement; DMIAC. Six Sigma also has the idea of a different framework for innovation projects, for projects that are going beyond simple improvement of a process for coming up with a new process, so the idea is designed for Six Sigma. They are used for new processes, they are used for new products as well. Design for Six Sigma is an implementation framework that is different from the traditional DMAIC for Six Sigma process improvement projects. The idea of rapid improvement events or what are also called Kaizen blitz is, which is the idea that we meet once a week, we come up with an improvement idea and we go out and implement it, and then we meet the next week. It's a fixed one hour, couple of hour meeting where we are able to talk about improvement projects. Typically, these rapid improvement events use the PDCA framework, the plan, do, check, act cycle, and they may also use the A3 format within which they'll use the PDCA framework. That's one

way of implementing process improvement projects, the idea of our RIs, or rapid improvement projects. Recently, what has also become popular, although it has existed for some time, the idea of huddles has recently become very popular with companies that are doing process improvement. The idea of huddles comes from sports teams, when you have a football team, they're running a play, they have a huddle where they decide what they're going to do on that next play. It's the same idea when you're talking about process improvement. A daily huddle is one that is held at the start of shift, so if there's a 9-5 shift, it's going to be held at the start of shift, it's a stand-up meeting, it's a 10-15 minute meeting at max, sometimes even less. It's led by different people who are working on the process, so it could be different people's responsibilities that are working on the process. It's usually held in the break room or where the work is being done. They just meet in the hallway there, there's a chart, there's a board that takes care of keeping track of the information of what was talked about in the huddle, so they have huddle boards that are taking care of information there. The idea is, you do this on a daily basis. You talk about improvement ideas, but you also talk about day-to-day fixes. Somebody is not going to be able to make it to work, how are we going to make up that capacity? We have an additional order that we need to cover today, how are we going to take care of that additional order? If you're talking about this in a hospital, we're saying we're expecting a larger number of patients today. How are we going to take care of that when we know that we have one absentee because of ill-health? Those things are what are being talked about in the daily huddle, as well as process improvement ideas. Then you have escalating to a weekly huddle, and then escalating to the next level of huddles. When you have this huddle system of process improvement, what you're essentially doing is that having these very frequent meetings, daily meetings, and then the weekly meetings, then as you go higher in the organization, you have less frequent meetings which are being held based on input that they're getting from these huddles. The huddles are not only for process improvement projects, but they are also a good visual for a CEO to be walking through a particular area, for a top management executive, for a middle management executive to be able to see what is being done in that particular area. What is the level of engagement of that particular area in process improvement? What are the problems that they're facing in that particular area? It gives them a good visual when they can go see the huddle board, which is in the workplace where the work is being done, so they can go see it, and they can get a quick glance without asking for a presentation, without asking for a meeting, they can get a quick glance of what's going on there. Now finally, what you have here is the GE workout sessions and the CAP, the change acceleration process. The workout is actually a registered trademark of GE, it's the idea that they have executives meet in a room, they close them in that room based on them having cross-functional discussions on what the problems are and how they're going to try and solve them. It's a very high-energy session where there's frank discussion of problems that

are being faced and trying to come up with solutions right there within the boundaries of that particular session and not having to wait for a long time for things to get solved. It's getting people's attention focused on problems and talking to all the people that may be involved, and that's why the cross-functional involvement. Not being able to say, but we don't know what that other department thinks, you have everybody there. Getting the right people in a room and going over it for a couple of days and trying to hash out problems and trying to take care of problems right there. That's another framework for implementation of a process improvement project.

Lesson 2-2.4: Define-Measure-Analyze-Improve-Control (DMAIC)

DMAIC FRAMEWORK

Define
: Objectives, defects
: Team, deadlines

Measure
: Metrics, data
: Current performance

Analyze
: Hypotheses and cause-effect tests

Improve
: Solutions developed

Control
: Implementation and change management

Now, we're going to focus in this course on Six Sigma and Lean. Here's the structured framework for Six Sigma, which is DMAIC; define, measure, analyze, improve, control. Essentially what this framework does is it takes the idea of defining the objectives of a project. What are we going to try and achieve with this project? What is the current baseline and where are we going from that baseline? If you recall the idea of Sigma levels, we can say at the define phase, this is level at which we are, and this is a level at which we are trying to go. In the define phase, you also have the deadlines for the teams being determined in terms of when are we going to finish the define phase? When do we expect to finish measure, analyze, improve, and control? In the measure phase, what you're doing in a Six Sigma project is you are fixing the metrics that you are going to focus on. Then you are checking whether those metrics are available or whether you're going to have to collect fresh data. You're saying, are those metrics available? Are they reliable? Are the metrics that we're seeing that are already there, are they reliable, and if they're not, then we need to come up with metrics that we're going to use in order to complete this project. The analyze phase, this is where the meat of the analysis is, this is where the root cause analysis happens. This is where the statistical tools of regression, analysis of variance, t-tests, and all those things get used in order to see is there a relationship of the causes with the effect that we're studying, and that's what you try to do there on the basis of which you come up with improvement ideas that you try to come up with in the improve phase. So you have improvement ideas that you try to cement, that you try to make concrete in the improve phase, and you say, this is what we're going to do in order to achieve the project objectives that we

went after. There the solutions are being developed that are going to get implemented. The control phase, which is the last phase, but also very critical. It's in fact, in some ways the most critical for a process improvement project because this is where the project ends, this is where the project is done, the project team moves on and now it's in the hands of the people who are actually working on the process day-to-day to take the changes that have been made and implement them. Make sure that the process doesn't go back to that same level of performance that it was before the improvement, and make sure that the improvement is not just a small burst when the enthusiasm is there while the Six Sigma project team is there, but that it continues on after that. How is it going to get sustained if we go back there after six months? Has the process not atrophied back? Has the process not deteriorated back to the earlier level? Has it stayed at that higher level of performance that we were trying to achieve with this project, and how can it continue from there? Not only that, how can we take that and develop the next cycle of DMAIC? It goes back to the idea of continuous improvement. Go back to defining new objectives for a new project based on that process, and get to the next Sigma level for that particular process, so continuous improvement in that sense.

Lesson 2-3: Starting a Lean Project

Lesson 2-3.1: Lean Thinking, Flow, and Waste

LEAN THINKING

(Womack and Jones, 1996)

Define value precisely from end customers' perspective

Identify the value stream for product or product-family and eliminate waste

Make the remaining value-creating steps flow

Let the end customer pull – provide customer requirements at right time

Pursue perfection through interaction and repetition of the previous four steps

As you know, under lean, under the Toyota Production System, there isn't a specific framework for implementing projects, for executing projects like we do in Six Sigma. In lean, we don't have something that is exactly like that, that takes you through steps in doing a project. But when you're thinking about initiating a lean project, there are some things that you can think about from the point of view of how do you think about defects? What is a defect? One way of thinking about lean, and this comes from a book which is called Lean Thinking, it talks about lean from the perspective of five different things. You start with defining value from a customer's perspective. You start thinking about assessing a process based on a value from the end customer's perspective. What is the external customer going to get from this process? What is the customer of this process going to get from this process? What does value mean for that customer? Next, you identify the value stream from which that product, the physical goods or the services will be delivered to the customer and you start to eliminate waste. Going back to the first objective of defining value and tying that into the idea of a value stream to eliminate waste. If you think about what is value from a customer's perspective, it's something that a customer would pay an extra dollar for, an extra euro for, an extra rupee for. That's how we define value, that's how we think of value. What is waste from a customer perspective? It's something that a customer would not be willing to pay an extra dollar for, an extra euro for, an extra rupee for. You can think about waste and value from purely the customer perspective. Moving on with the framework, if we can

call this a framework, we have value, the value stream, and then you make the remaining value stream value-creating steps flow. It's value, value stream, flow. Flow simply means that there are no obstructions in the process. If you're talking about patients going through a health care process, they don't have to wait. They flow continuously through the whole process, through the whole value stream. If you're talking about a product, it doesn't have to get stalled for any reason. It doesn't become part of a big batch of inventory that sits there, it certainly doesn't have to go back for any quality issues, so if you focus on flow, you're making the product flow through the whole value stream. It is going to be something that is going to reduce waste and create more value for the customer. These are all tied into each other in the sense of these being broad principles of lean thinking. The next step that you want to focus on is letting the end customer pull. Again, this goes back to the idea of waste not creating anything before the customer actually wants it. The customer pulling rather than the previous process pushing towards the customer. Even if you're thinking about internal process customers, they're not making product to push to the internal process customer, they're making it only when the next process, the next task requires that product. It's value, value stream, creating flow, and then letting the end customer pull, and then finally pursuing perfection, when you're talking about all of these steps. Making sure that there are no defects, making sure that these four aspects, these four steps, these four principles, whatever you want to call them, are adhered to, are stuck to in a nice way and also thinking about treating this as a cycle. Again, going back to step 1 and pursuing perfection in the sense of, well, can we get more value from this process? Can we give more value to the customer from this process? Can we reduce the waste even more? As we always think about in process improvement, it's always going about it in a continuous fashion, going back to step 1 and starting all over again, once you've been able to successfully get some improvement from the process. That's how you would start thinking about a project when you're thinking about implementing lean in a process.

BENEFITS OF CONTINUOUS FLOW

(Liker, 2005)

Quality
Work passing on with no defects

Productivity
Less storage and handling

Space
Uncluttered and available

Lead Time
Shorter, aiding flexibility

Employee Morale
Recognized value of work and teamwork

Cost
Reduced inventory and defects

We talked about flow when we talked about the whole idea of Lean thinking, and how does flow become beneficial? Why does Toyota focus so much on flow? Why is the whole idea of Lean focusing so much on flow? If you think about it, it will become very obvious when you see why flow is good for any kind of a process. When you're talking about a continuous flow, it also implies that there are no defects, quality is perfect. When you're talking about continuous flow, you're talking about there being less handling of things. You're not taking things and stocking them and then bringing them back to the next task. It's simply going through from one task to the other. It's coming from the supplier directly to the assembly line, things are getting done to it, and it's becoming a finished product very quickly. The productivity is also becoming high. Space utilization is optimized. It becomes very good when you have continuous flow, you're simply not storing stuff, so space utilization is much better. You don't need too much space for inventory. You don't need a big warehouse because stuff is continuously flowing. Moving on, lead times are shorter by definition when you have continuous flow versus a flow that's being obstructed, the lead times are going to be short because things are moving through quickly. When lead times are short, what happens? You can give the customer more choices. You don't have to tell the customer, we're busy making one thing and we'll make your product later. Also, you're able to change things for the customer. You're able to be more flexible for the customer and because you are initiating the production, not much before the customer ordered it. You don't have to create things in advance. If there's continuous flow, you can wait until the last minute and get that continuous flow and make exactly what the customer wants, so you are not making any wasteful product in that sense. When you have continuous flow, it helps employee morale. There are some tacit ideas, some tacit improvements that you get

when you improve process flow because their value is being highlighted. They can see what their value is when there's continuous flow. They can see what piece of the work that they're doing. They can see their contribution to the work. When you have continuous flow, the additional thing that you get, the additional implicit thing that you get is you automatically get teamwork, and the way that works is, if there's a problem, everyone gets together to make sure that there's a continuous flow because that's what we're focusing on. It generates the idea of teamwork or you can think about it the other way that you need teamwork for flow to take place, for there to be continuous flow. Either way, there's a connection between continuous flow and the idea of teamwork. Continuous flow also ties in with the idea of teamwork. Finally, the point that you're going to have reduced costs when you have continuous flow. If things are flowing quickly, there's less inventory, you are not investing too much in inventory, but more important than that, what happens when you have too much inventory? When you have too much inventory, you hide problems. You hide any inefficiencies. You hide issues that you might have with your machines or with your people over the product that's being made, and when you have less inventory, your problems are becoming visible very quickly and hopefully you are taking care of them very quickly because otherwise, it's going to be a broken process if you don't, especially when you have continuous flow and you don't have any buffers. In that sense, continuous flow helps with creating a value stream that is creating a lot of value with minimization of waste.

SEVEN WASTES IN LEAN

(Ohno, 1998)

Types	Description	Example
Defects	Errors, low quality, rework	Data entry error
Overproduction	Producing more, sooner than needed by next task	Unused printed reports
Motion	Unnecessary movement of employees	Walking back and forth, searching
Transportation	Unnecessary movement of material or customers	Supplies in multiple places
Time	Employee, machine, and customer idle time	Waiting for machine cycle, information waiting
Excess inventory	Materials or customers in stock or in queue	Excess supplies, customers waiting
Overprocessing	Redundant or unnecessary processing, doing what customer does not value	Inspection

Now, you can think about wastes from the perspective of Toyota. Toyota likes to think about seven types of waste. When we talk about waste, there's the idea of defects. The obvious waste which is errors, rework, any low quality is a defect that shouldn't be passed on to the next process customer. They also consider overproduction to be a waste. Overproduction in the sense that you produce more and you produce sooner than it's needed by the next task by the process customer. An example there would be if you're talking about an office process, if you're talking about, let's say an insurance company that's talking about insurance claims. Or if you're talking about a healthcare process where a patient is going through a healthcare process any unused printed reports, things that you are printing out but are not using is going to be overproduction, is going to be excess inventory. What you can see from here is that these aspects can as easily be applied to the service industry as well as the transactions processes rather than just thinking about manufacturing processes, just thinking about physical goods. The third kind of waste that Toyota thinks about is motion, unnecessary movement of employees. An employee having to go look for something, to go look for tools. Again, when you think about healthcare and the amount of times that there's a nurse who has to go find a working set of instruments for getting vitals taken from a patient who's on a bed. That is an absolute waste of motion when they have to spend their energy walking around looking for things. Even placing things in the right place is important when you're thinking about Lean because that means that you are reducing the movement, unnecessary movement of employees. The next kind of waste is transportation, which is movement of material or movement of customers. If you have to move material back and forth, if you have to send the patient to different places to get different things done and that can be avoided. That would be avoiding transportation for the customer. That

would be a way of reducing the waste. Time is the next kind of waste that Toyota Production System or Lean emphasizes on. There, we're talking about any idle time from a machine. When you have somebody who is operating a machine and when they press a button and the machine starts doing what it does, and they stand there watching that machine cycle through. That's not value-added. That's a waste as far as the time of the employee is concerned. The Lean system talks about separating the time that the employee needs to be there from the time that the machine needs to work. Those are two separate things. Don't think of capacity utilization of them combined together because a person is standing there watching machine is not really adding any value, and that time should be utilized with something else. When you think about time. Toyota also thinks about, or the Lean system also thinks about the idea that when there's extra information that's sitting there waiting, it's a waste. We don't need extra information to be waiting for it to be processed and that can be a waste. The second last waste is excess inventory. Any inventory, as we talked about earlier, it not only costs, but it's also going to be hiding any defects when you're talking about materials inventory. Inventory could also be customers waiting. Inventory could also be patients waiting to be processed. Even that inventory is considered waste. That's an obvious waste because you're having the patient wait or you're having the customer wait for them to get service. Over-processing, the idea that you do some things that are not adding value from the customer's perspective. Here the example that I have given is inspection. Inspection, if you think about it, is trying to make a product perfectly for the customer. Is the customer willing to pay an extra dollar, an extra rupee, an extra euro for inspection? The answer is no, they're not going to pay you extra for the inspection. Inspection should be avoided in the first place and it shouldn't be there. Any over-processing when you're talking about a manufacturing process. When Toyota is making cars, they're also constantly thinking about whether there's any paint needed in the area that's going to be under the seat. If that's something that can be reduced, if that is something that can be eliminated without affecting the quality of the product, then that's something that they want to avoid, that's something that they want to reduce because that's what they consider over-processing, making something that a customer doesn't really value. That's another perspective when you think about Lean, the seven wastes.

Lesson 2-3.2: The Value Add Perspective of Lean
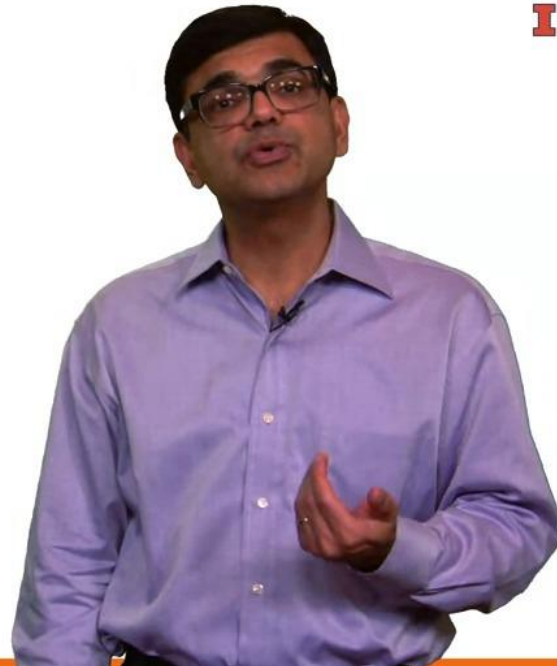
ASSESSING VALUE ADD

Value Adding Activities (VA)

   Essential in delivering product to customer, for which customer is willing to pay

Non value adding activities (NVA)

   Consume time, resources, or space but do not contribute to value

Value enabling activities (VE)

   Necessary to run business

One more perspective in terms of thinking about lean is the idea of value-add. Now you've already heard me talk about the idea of value, value stream and adding value for customers through the value stream. But when we're thinking about value-adding activities, it helps to classify activities between value-added, non-value-added. What do we mean by a value-added? It's essential for the customer. What's non-value-added, it's not helping the customer at all and we also have an interim categorization, which is value enabling activities. You may consider this to be a cop-out when you're saying that when something is not quite non-value-adding, it's essential, but it's not giving anything to the customer. We may call it value enabling. But if you think about a lot of products that are made, a lot of processes that are used to make products. There are some things that are essential for it to be done. For example, getting something approved from Food and Drug Administration inspectors because it is something that is a product that's going to be sold to customers in the food industry or in the drug industry. That's something that you have to do. It may not be adding value from a customer perspective. Or you can debate whether it's adding value from a customer perspective. You can also think about supporting activities like doing your payroll. That can be something that is necessary for running the business, although it may not be adding value from an end-customer perspective. That's why you think about this classification of these three different types of value adds, value-add, non-value-add, and value enabling. Now what you can do is,

IN-VIDEO QUESTION

Categorize the following among value adding (VA), non-value adding (NVA), and value enabling (VE):

- Receiving orders
- Processing payroll
- Stamping out a part
- Searching for a functioning thermometer
- Inspecting incoming parts
- End-of-line cleaning before packaging

(Valley, 2010)

is take a look at these activities that we have and think about how you would apply this categorization. What activities would you call value-added, non-value-add, and what activities would you call value enabling? Take a minute and think about these activities that you have on the screen in front of you. You have six activities and classify these and we'll come back and see whether our classifications match.

IN-VIDEO INSIGHTS

Value adding (VA), non-value adding (NVA), or value enabling (VE):

- Receiving orders - VA
- Processing payroll - VE
- Stamping out a part - VA
- Searching for a working tool - NVA
- Inspecting incoming parts - NVA
- Dusting before packaging - NVA

You have these activities, the six activities that you were asked to classify. Receiving orders, if you're talking about any organization that is going to take customer orders. That's going to be a value-added activity because that's how you'll know what to make for the customer. Processing payroll. It doesn't have anything to do directly with the customer, unless you are a payroll processing company, there would be a value-added company, a value-added activity because then your core business is doing payroll for customers. But when you're doing, if you have a manufacturing business or a restaurant or a hospital, you would treat processing payroll as a value enabling. It's not dealing with the end customer directly. Stamping out a part when you're making something from it, when you're manufacturing something from it, is obviously going to be value-added. Searching for a working tool is non-value-added. That's something that shouldn't be there, it should be eliminated. Inspecting incoming parts is something that Toyota considers non-value added is something that you should be able to eliminate. Dusting before packaging the finished product. You clean it up before you package it for the customer is again something that under the lean system, under lean thinking would be considered a waste. It's not something that you should be doing in the first place. There shouldn't have been dust on the finished goods in the first place before it got to their customer. That's your classification of value-added, non-value-add, and value enabling.

VALUE STREAM

(Rother and Shook, 2003)

All process activities, including value added and non-value added, being used for making and/or delivering a product (good or service) to the customer

Now, let's take a look at what do we mean by a value stream. Now we started saying that when we're thinking about a framework for initiating a lean project, you start with value and then you move on to value stream. What is a value stream? A value stream is all the activities that had to take place for raw materials to get converted into finished goods right from the start of the process to the end of the process. That is simply what we call a value stream. It's all the activities that are to take place and it includes value-added and non-value-added this point. We're saying that when we study a value stream, we start looking at value stream. You are looking for the distinction between value-added, and non-value add. But first, you have to recognize the steps that have to be taken for it to get done, so that would be a value stream, the set of steps that need for raw materials to get into finished goods.

VALUE STREAM MAP (VSM)

(Rother and Shook, 2003)

Simple visual tool to help understand process flows

Usually drawn using a fixed set of icons

Serves as common language

Intended to provide perspective of entire process, including information flows

Value stream mapping. Now value stream mapping is a technique that Toyota uses that is popular under lean implementation for you to start seeing what a value stream is doing. The book in fact, that talks about value stream mapping is called Learning to See and the reason it's called Learning to See is because a value stream map gives you a great visual tool to understand Process Flows. It talks about, it points out where they're going to be stagnations in the process. It points out where they're going to be issues in terms of imbalance in workloads. It points out all these things just by mapping out a process. In fact, it's a very useful exercise for any process regardless of where they are in the continuous improvement initiative to value stream map every process. Because it lets people see a lot of things from what's going on in the process. Usually, a value stream map is drawn based on a fixed set of icons. The book that I talked about earlier, Learning to See and there are several other publications nowadays that talk about value stream mapping. They will give you a set of icons. There's a specific language, there's a specific syntax that is involved with value stream mapping. What do you call inventory? You call it a try. You. How do you depict inventory rather? You depict it as a triangle. How do you depict a task, an activity? You depict it as a rectangle or a square box. Where do you write the information about the activity? You write it directly underneath it. How do you depict a push process versus a pull process? That's something that you learn when you start learning the language of value stream mapping. There's a certain set of icons. With a little bit of adjustment, most companies do use a standard set of icons that you can see out there being used for value stream mapping. Now, value stream mapping also serves as a common language because it has the syntax in it because people are using this common set of icons to depict the value stream map, it helps to have conversations about the process. In fact, companies that do this right,

who do Lean implementation correctly, make these value stream maps. They don't put them in their offices, they put them where the work is being done. These are pasted on the wall where the work is being done. These are things that are seen by everybody who's working on that process so that they understand what their contribution is to the process, as well as if they have an improvement idea. If they can see a problem with that particular value stream, they can bring it up and say, "You know what? We should be able to do this differently or we you should be able to add these two activities together or separate this activity into two, and this is how we can make an improvement." Or they can point out to something that's actually different from what's being depicted up there. It gives you a real visual of how the work is happening in the process when you talk about a value stream map and it's a visual that is ready for everybody to see. It provides a perspective of the entire process. Typically, when we talk about value stream mapping, we talk about it from dock to dock, when you're talking about a manufacturing process. The dock where the raw materials come in to the dock where the finished goods go out. You take every step and you try to map it. It tries to give a perspective of the whole process. What do we mean by that? If there's a particular activity that may be running very efficiently, but it's running efficiently by either pushing inventory to the next step or creating a lot of inventory at the previous step, it's going to show up on the value stream map. If there's a particular activity that has a high defect rate or has a high degree of variation in how work is being done there, it's going to show up in the inventory before, when there's a high degree of variation in the work that's being done there. It will start giving you indications of how the process is doing and how the entire process is doing. Not just each activity, not just each person, not just each machine, not just each step in a service process, in an office process, but the entire process and how it's doing. It gives you a systems perspective in that sense.

VSM FOR CONTINUOUS IMPROVEMENT 1 OF 2

Current state map

    To understanding how things work

    To ask more in-depth questions

    To consider improvements

Future state map

    To design a better flow

    To assess potential impacts of changes

Steps in terms of if you were to think of value stream mapping as a way of thinking about continuous improvement. You can. You can think of this being a heuristic. You start with a current state map, you move on to a future state map. What's a current state map? A current state map is depicting how the process is currently doing. It's including all the value-added, non-value-added activities, and it's simply understanding how work is being done currently. That's why it's called the current state map. It gives an indication of where are the opportunities to make improvements? Where can we actually try and make improvements and what is the reason for why some things that seem to be inefficient are there? Why is there so much inventory at this spot? Why is this task not divided up into two, or why are these two tasks not combined together? At least you start asking the questions based on what you see in the value stream map, because not every solution that pops up in your head may be viable. It starts you to get to ask questions about it. What you can do as the next step is come up with a future state map. Based on the questions that you ask, based on the inefficiencies that you see, based on the improvement ideas that you have, you come up with what is called a future state map. Future state map is meant to design a better flow. It's going after those ideas of value, value stream, creating a better flow, creating pull for the customer. That's what you're trying to depict in a future state map.

VSM FOR CONTINUOUS IMPROVEMENT 2 OF 2

Planning

    To get to future state

Implementation

    Achieve future state

New current state

    Achieved future state as starting point

Repeat cycle

Now, that's, in essence, a plan. You're starting to plan for making an improvement. The next step should be coming up with concrete steps as to how are you going to try to get to that future state? When you do have a future state, what are some of the things that you plan to do to get to that future state? That becomes the next step. Now that should be, as we always say, in continuous improvement, it should not be vague, it should be specific, it should be who is going to get what task done. It should be with dates. It should have a date involved with by when should this task will get done and should have somebody signing off saying, I take responsibility for getting this done in the next 30 days. That's what we mean by planning for a future state. The next step is implementation. Achieving that future state, so doing things to achieve that future state, and then achieving it, and maintaining it. Then what happens when you do achieve that future state? Like we've always said with all kinds of continuous improvement initiatives or frameworks, it's always, go back to step 1. Here also, it's the same thing. The future state becomes a new current state. It's a new current state from where you start the new cycle of improvement. We always come back to the idea of continuous improvement, being this heuristic, that starts from a certain point, whether it's bottlenecks, or customers, or reduction in variation. In the case of Lean, it's reduction of waste. You start with reduction of waste as the objective, you do certain things to achieve that, and then, at the end, it's always go back to step 1.

Lesson 2-4: Starting a Six Sigma Project

Lesson 2-4.1: Define Phase in DMAIC

DMAIC FRAMEWORK

Define
> Objectives
> Team

Measure

Analyze

Improve

Control

This session is about the defined phase of a six sigma project, so when we think about define measure, analyze improve control here, we're going to talk about what happens in the defined phase. What are the different techniques that get used in the defined phase and what are we trying to accomplish in a defined phase? So in the defined phase of a project we're trying to form up the objectives, what are the goals of the off the project? What kind of performance improvement are we trying to achieve and being more specific about it? So six sigma is all about being specific about the goals to the extent that you can come up with a a dollar value, a monetary value, whether it's in dollars or euros or pounds or rupees. It's what kind of monetary value are we going to get from doing this project and in in that sense of benefit, cost analysis of what we're going to get from this project. And in the defined phase you also have to establish the rules that will be used to conduct this project, who are going to be the team members? What kind of time commitment are they going to have for this particular project? Are they going to be working full time on this project or they continue to do the other things that they do in the organization? And those are the kind of things that have to be established before a project get started, the project. A good defined stage in the project would include dates in terms of when the defined face ball was expected to get completed and then when each of the other phases is expected to get completed. It would also have some kind of sign off for each stage and what are the responsibilities of the different team members that are going to be participating in that team for that six

sigma project. What you also want to take care of in the defined phase is the fact that you are, you may have some support processes that might be required. So are they going to be support processes that need to help and are they going to be part of the team or are they simply going to remain outside the team and provide the support? So if there's any support from the facilities department in terms of having to move equipment, if there's going to be any support from the information systems department. In terms of software that needs to be developed for any kind of data collection or solutions that you might come up with from this project. Then that needs to be incorporated in the defined phase and what you have at the end of a defined phase is a deliverable, which is a project charter. And we'll see what a project charter is toward the end of the session and that's a deliverable, that that becomes like a contract that is saying that is talking about all these things. What are the objectives and what are the team members and what those team members will be doing on this project?

KANO CUSTOMER-NEEDS MODEL EXAMPLE: CAR

Dissatisfiers

Expected, basic, must-have features

Example: Safety

Satisfiers

Expressed requirements, more-the-better

Example: Fuel consumption

Exciters/delighters

Unexpected features that customers value

Example: Collision sensors

Over time, exciters/delighters become satisfiers and, eventually, dissatisfiers

So let's take a look at some concepts that you want to use when you are trying to define the objectives of the project, so the first concept here is the idea of customer needs. You want to think about what is the, who is the customer of the process and this particular way of thinking about customer needs is about external customers. So the kano model of customer needs talks about customers from an external customers perspective and divides up the needs of customers into three categories. The first category is dissatisfiers, so what is dissatisfiers mean, it is, these are features of a product that if the customer does not have, they will be very dissatisfied, they will be disappointed. And you can think of these as even being order qualifiers, so you may have heard of the term called order qualifiers, so you can think of these terms as being order qualifiers. These are things that if the customer does not get from your product or process, they're not even going to consider you as as a provider for the product or process. So here, I have an example that I'm going to use throughout the three types of customer needs that we're focusing on in the kano model and the example of a car. So what would be a dissatisfier for a car, if it's not safe, then it's going to be something that no consumer would want to consider, so, safety would be a essential aspect of a car. Moving on to satisfiers, are things that customer expects but more the better, right? So it's something that they are going to have expressed requirements of and the more you can give them of that particular feature, the better. So fuel consumption is one that comes to mind right off the bat when you're thinking about buying a car, that the better the fuel consumption, the better it is going to be for any customer. So that's sort of a linear relationship when you're talking about what this particular feature is and the level of satisfaction of the customer better food, fuel consumption, higher satisfaction. The third category of customer needs, when you're thinking about the kano model is the

delighters, the exciters. These are aspects that a customer may not be expecting from your particular product or process but there might be things that the customer would value if you would actually give it to them. So, for example, if you're thinking about a car and you're thinking about collision sensors that you're providing in the car at no extra cost, that would be important, right? If you're going to charge for those things and that's going to take away from solving the customer need at a price, then you want to give it to them at no extra cost. Which would say that you're getting this extra value from this product and that would delight the customer. So once again, you can think of dissatisfiers as being your order qualifiers and exciters on the other extreme of the kano model could be your order winners. They are the aspects of your product or process that will help you win customers over from competitors based on something that customers value. Now, what you'll notice about these aspects when you start thinking about them is that over time, what will happen to exciters and delighters is they will become dissatisfiers, right? There will be things that customers expect, so, if you're thinking about a cell phone, for example, different example from a car, a cell phone. And you think about cameras in a cell phone, they are no longer something that there are exciters for customers who are looking for a cell phone. In fact, if you don't have a camera and a decent camera that it becomes a dissatisfier or it would not even be considered by a customer when there looking for cell phones. So when you have exciters and delighters, you want to keep an eye on whether they remain exciters and delighters over time or they become satisfiers and eventually dissatisfiers. So that's a perspective that you want to keep in mind over time that this is going to be dynamic,

VOC, CTQ, AND DEFECTS
EXAMPLE: ROOM SERVICE

Voice of the Customer - Customer need

"Provide me with good room service"
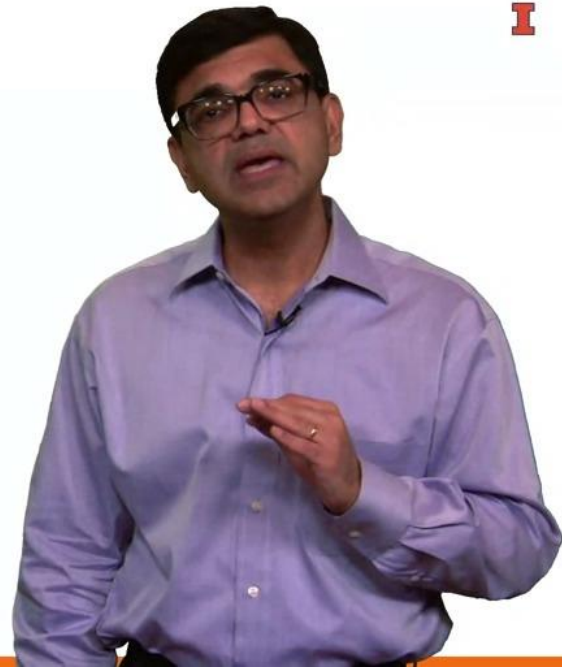
Customer requirement - Driver

"Deliver quickly"

Critical to Quality - Standard

"Deliver within 30 minutes"

Defect - Process outcome that does not meet a customer requirement

"Any order not delivered within 30 minutes"

a way of thinking about getting to what is it that the customer actually wants from product or a process? Is this idea of a voice of the customer analysis, so we take voice of the customer and here we were talking about a customer need of providing good room service. So a customer says, if you talk to a customer, what do you like from coming to this hotel, I like the fact that it gives me good room service or I expect good room service when I come to stay at this hotel. So you say, well, what is the driver for this particular kind of customer service? So providing with good room service would require from an operations perspective, from a process perspective, delivering quickly. That's what we need to deliver from a process if the customer is going to get good room service. So what do we need to do with that when we're thinking about this in terms of a process metric or a metric for a six sigma project is we need to convert that into a standard which is critical to quality. So going from voice of customers saying, what does the customer want to what is the critical to quality characteristic of the process? And there we want to get more and more specific and more and more precise as precise as we can get. So we here we use the example of customer need of good room service translating into good delivery times, delivering quickly and getting more specific, delivered within 30 minutes. So it's that specific that it should be delivered within 30 minutes, which then obviously gives us the definition of a defect. Which a defect is, if it's not delivered within 30 minutes, it's a defect, so we've gone from a subjective ways of the customer to an objective definition of critical to quality characteristic. And an objective definition of a defect and that's the idea that you want to pursue in any aspect of a product or process, especially when you're talking about six sigma.

SIPOC
EXAMPLE: ELECTROPLATING
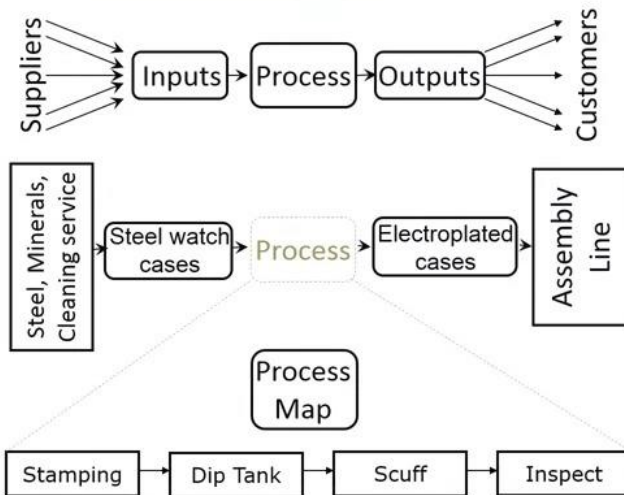
Another technique that is, that gets used when we're talking about the defined phase of a six sigma project is what is called Sipoc diagram or the Sipoc analysis. And the starts from the suppliers and goes all the way to the customers with the input process, output being the steps in the middle. So here we have an example of getting steel watch cases electroplated, so what do we have as the suppliers? We've got the steel, the different minerals that are needed for electroplating, the different chemicals. And then we have some kind of cleaning service that's taking care of doing some of the cleaning for the watch cases before they go into the electroplating. What we have as the inputs is the steel watch cases, what we have as the process and typically what you do in the side pocket diagram is you depict the process as a box. But then you break it down into its different steps based on a process map and instead of a process map, you could also be thinking of a value stream map or you could be thinking of a flow chart. Any kind of a process map that is going to depict the process is, what are you going to include in that sipoc diagram? So here we've broken down the process of electroplating to stamping, dipping tanks, cuff and inspect, those are the four steps of the process map is made up of. Next you have the output, which are the electroplated cases and and then they're going to the customer. And the customer in this case is the assembly line that's going to assemble the watches with the cases that they're using from here. So a sipoc diagram helps you to think about points at which there might be defects because then you can think about, well, is it from the input? Is it from the supplier, the input or steps in the process map or is it from how we are delivering the output to the customers? And it helps you think about these things from a systematic way when you're looking at each of the steps in the sipoc and each of the steps in the process.

TIME COSTS
EXAMPLE: ELECTROPLATING

Name	Position	Hourly Rate	Hours/ Week	Cost for 22 weeks
Katrina Chang	Black Belt	100	2	€ 4,400
Schwan Lieberman	Green Belt	50	2	€ 2,200
Al Sherman	Line Supervisor	50	4	€ 4,400
James Metcalf	Maintenance Manager	25	4	€ 2,200
Gina Leshowski	Line Worker	18	4	€ 1,584
Michael Kim	Procurement	45	2	€ 1,980
Ann Ramsey	Human Resource Manager	50	2	€ 2,200
				€ 18,964

Next, when you're thinking about the defined phase, what needs to be done is you need to get an estimate. So like we said in six sigma, there's going to be some sense of what is this project going to bring to us, what is it going to bring to the company in terms of increasing sales, reducing inventory? Is it going to reduce costs in some way, is it going to improve the cycle time, is it going to improve the turnaround time for customer orders, what is it going to get us? So it's going to get us some benefits but they're going to be some costs involved in it and here you have an example of simply the time of the different people who are working on that project team. So you have the black belt, green belt and then you have various team members in this case. We're still talking about that electroplating project that we use as an example for the sipoc and you have different people working on this project. So you have line supervisor, the maintenance manager, the line worker and then you also have procurement and HR manager. Because they might have some kind of say in terms of what changes can be made to the process. But the idea here is that you're getting an estimate in terms of the time that they're going to spend. If there are other expenses that need to be included, those can be added to the time cost of the people.

Lesson 2-4.2: GANTT Chart and Project Charter

GANTT CHART
EXAMPLE: ELECTROPLATING PROJECT

Tasks	Responsibility	Week																					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Project 1																							
Define	Katrina Chang	x	x	x	x																		
Measure	Schwan Lieberman					x	x	x	x														
Analyze	Katrina Chang								x	x	x	x	x	x	x								
Improve	Katrina Chang															x	x	x	x	x			
Control	Al Sherman																		x	x	x	x	x
Project 2																							
Define	Katrina Chang																						
...																							

Here you have something that is useful for any kind of project planning a Gantt chart. An Gantt again chart is basically giving you a sense of what are the different steps that need to be done. So on the left side you have define measure, analyze, improve control as the five standard steps of a six sigma project. And then what you have right next to it is who has got responsibility for getting that part done. So in this particular case we're talking about the same example of the electroplating project that we started off from the sidewalk diagram. So in this particular case the black belt, six sigma black belt has the responsibility for the defined phase. And then somebody else has a responsibility for measure phase and then we go on and going through the different phases. So the Gantt chart Is not only the responsibilities but moving on to the right part of this, then you have this project is expected to take 22 weeks. And are there going to be Parallel Times for any two phases. So here you can see that in the 8th week the measure phase and the analyzed phase, there's an overlap there that maybe there for a particular reason. And then towards the end you see that there is an overlap between the improve and the control phase. So the Gantt chart is used in a sense to map out what are the different activities that will be done in parallel and together. And then in this particular case, what I've shown over here is that there might be multiple projects that this particular six sigma black belt Katrina Chang might be dealing with. So she might have other projects that are listed below this in terms of where they will be in these particular weeks. Just to get a sense of what kind of workload she's expecting and what needs to get done before something else. And this could even flow into projects that have to be done in

sequence, one after the other. So when do you expect one to get done and and the other to get started and so on and so forth.

PROJECT CHARTER
EXAMPLE: ELECTROPLATING DEFECTS PROJECT

Business Case
This project supports the business objective of defect reduction. This project will save the company $175,000 per year in material costs and free up 20% additional capacity.

Opportunity / Problem Statement
33% of watch cases have to be reworked in electroplating. These defects are hurting capacity utilization and costing roughly $250,000 per month for rework.

Goal Statement
Reduce errors in electroplating to less than 10% and cut rework costs to $75,000 by the March 31 next year.

Constraints
Team members can devote a maximum of 25% of their time to the project. Project must be completed in 120 days.

Assumptions
Standards of acceptable finish will be kept unchanged.

Risks and Dependencies
Cleaning processes before and after electroplating are currently outsourced to multiple providers of the service.

Team Members
- Katrina Chang, Black Belt
- Schwan Lieberman , Green Belt
- Al Sherman, Line Supervisor
- James Metcalf, Maintenance Manager
- Gina Leshowski, Line Worker
- Michael Kim, Procurement
- Ann Ramsey, Human Resource Manager

Team Guidelines
Regular team meetings at line-side, Friday mornings 9 am – 10 am. Team decisions by consensus with final decision by team leader.

Preliminary Project Plan
DEFINE – Nov. 15
MEASURE – Dec. 15
ANALYZE – Feb. 1
IMPROVE – Feb. 15
CONTROL – Mar. 15

Now finally as a deliverable from a six sigma defined phase from the defined phase of a dmaic project. The most important deliverable is the project charter. And once again, I've stuck to the same example the made up example of the electroplating defects project to give you a sense of what a project charter contains. So here you have the business case being made, why should we do this project? What does it mean? So if you think back the strategy deployment, this is where you're connecting all of this to what is the operation strategy, the business strategy of the company. Now, obviously you can see that when you're talking about the business case and trying to connect it, you can use a x matrix to come up with the business case. And use that as a supplement to talk about the business case because that will connect the operation strategy, the business strategy explicitly to what the project is trying to achieve. So what you have next in this project charter is the problem statement. What is it exactly that is the problem? So 33% of watch cases have to be reworked in electroplating and that's a very high percentage. These defects are hurting capacity utilization and costing roughly 250,000 per month for rework. So now we have a sense of, how much is it costing for rework? And there can be a benefit to cost analysis. Are the costs of this project going to be worth it? And when you look back to what we saw in terms of the time costs 250,000 being the expected benefit that you can get from this project will make this project worth it. Next you have on the project charter the gold statement, and here you can have sigma levels, right? You can be saying, this current current process is at a certain level of sigma, is at a 2.5 level of sigma and we're trying to go to a 3.5 level of sigma. Or you can be stating it in different terms and here, I've stated it in terms of

reducing errors to less than 20 1%. So from 33% to less than 20% and cutting down rework costs which were originally at 250,000 to 75,000. And by the date of March 31 next year. So that's the date that's being targeted for this goal to be achieved. What you also have in the project charter is our constraints and assumptions. So what are some of the things that we can assume and what are some of the things that we cannot do? So the constraints are team members can only devote a maximum of 25% of their time to the project and the project must be completed in 120 days. Now these constraints might be specific to this project or they might be constraints that are applied to all projects at a certain level. So all six sigma projects. All black belt projects might have a certain restriction in terms of number of days which is not to say that you don't want to solve a problem. That takes a long time except what the company might be talking about there is that they might want to break up the project if it's too long. So that might be the idea because you don't want a project to go on forever you want to break it up. And the cliché that gets used when we're talking about project charters is that you don't want to try to solve world hunger with the project? You want to take something that is manageable to a project and then work on that before you move onto the next project. Right, so next we have after constraints and assumptions, the risks and dependencies. What are some of the other processes that might get affected when you do this project? So, one of the dependencies that we have in this particular electroplating defects project is that the cleaning process that is before and after electroplating is currently being outsourced. So if they're going to be impact of that on the defect rate, and we're not saying that that's the case right now, but that's something to keep in mind that something to try and analyze. And keep in mind that whether that's going to be a decision that can be taken within the scope of this project, whether we can bring cleaning process in house. Or whether that outsourcing decision is out of scope for this project and that's just a given that has to be taken going forward. Right, so that's that's the left side of this project charter, on the right side, you have the information about the team. So you have the different team members that are mentioned and then you may also have guidelines for how the team is going to make decisions. So here you have specific timings for the meetings being mentioned, It's going to be on a certain day at a certain time, but you can also have rules for how decisions are going to be made. Is it always going to be a consensus? Is it going to be by majority? And is it going to be by tie breaker from the team leader? And that's something that needs to be stated up front in terms of how the team is going to move forward, you don't want to get a team that gets locked into arguments and never makes any decisions. And finally, you have as part of the project charter, a project plan that is also reflected in the Gantt chart that we saw earlier, which is that certain things are going to be done by certain dates. And then you have a control phase that's being completed by March 15th. So that is beyond, that is before the targeted date that they had earlier on March 31st. So this, this project is targeting March 15th as the end, giving a buffer about 15 days for that March 31st date.

So this would be your your deliverable, if you were to do this project. This would be something that you would deliver, that you would present at the end of your defined phase in preparation for moving on to the next phase, which would be measure phase.