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**Module 2 Assignment**

After reviewing the lectures, I can say that there are plenty of times where the Lean principles apply to the project that I am doing. Right now, the current project that I am working on involves proving in test equipment for missile production at Raytheon Technologies. At Raytheon, they produce missiles by first manufacturing each component as an assembly line, and then each component needs to be tested to verify it works before it can go to the next phase of production. This is especially crucial when it comes to producing military weapons because since military weapons are what protect our country as a whole, it is extremely important that everything is tested to make sure it works before it can be sold to the military. If a defect in a military missile is found that makes it unable to work properly during real combat, that can jeopardize national security as a whole. My project is to work on proving in a newly manufactured test equipment that's called a gap box to ensure that it will work and test correctly and get it into test production so that it can start testing missile components that are in production. I need to make sure that the gap box has no defects and no high voltages that could burn and damage the missile components under production.

One way that Lean principles apply to the project at my job is in waste elimination. According to the lectures, waste elimination is when you spend effort only on stuff that actually adds value for the customer. For my gap box project, the main customer is the US Military because they are ultimately the ones who are going to benefit from the test equipment that I'm doing for missile production. However, I would also say that the secondary customer is Raytheon Technologies company because when the test equipment gets into production, it will make it easier for Raytheon to sell missiles and make money from the military. For my particular project, the seven wastes mentioned in the lecture do not apply exactly to the project that I am doing because while software defects are indeed involved in the test equipment, we also deal with hardware issues with either the gap box or the test station instead of manufacturing. My project is also pretty unique from the waste elimination principle in that although we spend most of our time fixing defects and issues with the gap box, these issues were not caused by us. They were created by the manufacturing team that manufactured the gap box, we need to work and make sure that the gap box is working before it can go into production. Therefore, you can say that we are effectively spending our time to fix someone else's issues. Since these issues were caused by the previous team who made the gap box, it is outside of our control to eliminate that waste, unless we work with the manufacturing team. I would say for my gap box project, the best waste elimination method would be to eliminate waste from the process of fixing the defects in the gap box that are already there. This can involve learning as much of the software and hardware as possible so that I can minimize the wait time for my team lead to come and assist me with issues that I don't know how to fix. If I know how to fix issues with the software, I do not have to wait for my team lead to be here to help and therefore can eliminate time that is wasted. Another way to eliminate waste for my project is to learn to ignore defects or strange behavior that may not be relevant and important to the project. For example, if we get an intermittent voltage measurement that is out of the ordinary, it is best to just ignore it and move on if subsequent measurements yield the expected result. Intermittent measurements can occur anywhere at anytime, paying too much attention to that one measurement will only waste time.

Another application of Lean practice for my gap box effort is in optimizing the whole. Optimizing the whole involves caring about outcomes that are at the higher levels of the customer and job satisfaction instead of at the lower levels. Optimizing the whole is indeed very important for my gap box project, unfortunately, since I am at a lower level of the hierarchy for the project, I am not very involved in the higher level management of my project. I am only in charge of the software portion of the project, my team lead is in charge of the more high-level management of my project. If you go even higher, you have the integrated product test lead, who is in charge of managing the government contract that is funding the project. If I am to work on optimizing the whole, the best thing for me to do is to learn as much about the project as possible so that I can take over as many of the higher-level tasks as possible. It would be great if I could do that because if I can take over my team lead's job, he can dedicate more of his time to his other projects, which will in turn contribute more to optimizing the whole since he is able to commit more of his time to his other projects which are also for the US military, which would be a win-win for the customer and the company. Another way for me to contribute to optimizing the value of the project would be to help improve job satisfaction for my coworkers. Besides me and my team lead, I also have another team member I am working with. He is in charge of working with the hardware for the gap box, so we work together and if there is an issue with the software, it's for me to fix, if it's with the hardware, it's for him to fix. In order for me to increase his job satisfaction, it would be nice if I could respect his time and effort. To do that, I would have to be careful to not call him over to my lab unless there is work for him to do since he is busy with his other project. Also, when he is over at my lab working with me, I should be careful not to be a jerk to him and annoy him too much otherwise he would not be satisfied working with me on this project. This will be the best way to increase employee satisfaction and ensure that my coworkers and I can be productive.

Lean is also used for my program in the aspect that we need to deliver fast. This is actually one of the most important principles of Lean for this particular project. The reason is that everything in this project is funded by a government contract that has a certain expiration date. Each contract can vary, but they usually demand that all the requirements are delivered before funding runs out or a certain expiration date, otherwise, there will be no money left to continue the project and Raytheon may lose profit as a result. Right now, the project is actually very close to the due date that is specified in the contract. There are only two weeks left before the contract expires, after that, there will be no more funding left and Raytheon may have to pay out of its own pocket if we are to continue to work on this. Therefore, for this gap box effort, cycle time measurements will likely be useful so that we can measure the time it will take to fix the gap box before the expiration date. However, the lecture mentions that "the goal is to deliver software so fast that our customers don't have time to change their minds." This is not going to work for our project unfortunately because our customer is the US government instead of regular consumers. Everything that needs to be delivered has already been specified in the contract a long time ago and we are just fulfilling the requirements in the contract. The only way to manipulate our customer into changing their mind would be in the contract negotiation process, and that is not something that is in my control.

So, to summarize it all, Lean principles are indeed useful and applicable for the gap box effort that I am supporting, just not exactly in the same way as the lectures describe. The lectures assume that the concepts will be applied in a free consumer market, this however is not the case for a government contractor. When it comes to work that is done in developing military equipment for the government, everything is usually very predictable and well-defined, there is not really any way to optimize and add extra features to what we are delivering. Waste elimination would be very useful for my company because as a defense contractor, we tend to be short-staffed on people so if the people that are here are capable of learning and doing as much as they can, it would do wonders for Raytheon. Delivering fast is also important not just because of the deadlines that are specified in the government contracts, but because it makes it more likely that the US government will contract us more for future projects. Earning the trust of the US government as a reliable defense contractor is important if we are to continue doing business.