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A client had a very complex repair center value stream consisting of several subprocesses including repair, refurbishment, reconditioning and swaps for warranty returns. Also, the repair center serviced approximately 40 different products ranging from complex systems to relatively simple components. How do we deal with such a high level of complexity?

As with any process improvement project, measurement of 'current-state' should represent voice-of-the-customer and voice-of-the-process. In this case, a service level agreement was established in the form of a lead-time goal (voice-of-the-customer). This goal was compared to actual lead-time (voice-of-the-process) during a weekly key performance indicator (KPI) review meeting.

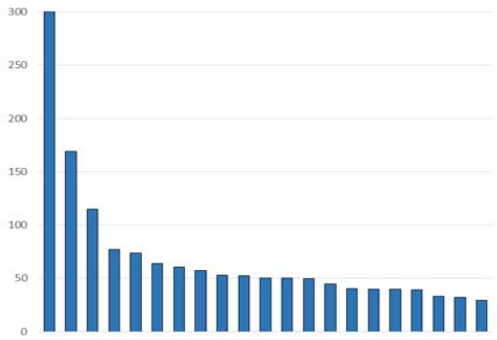
Note that lead-time also establishes (to a certain extent) a measure of process complexity. More complexity tends to take more time and a greater risk of something 'falling through the cracks'.

With our measurement of lead-time, we are now able to analyze the process for stability. Data revealed 'typical' lead-time as well as outliers (lead-time drivers). Lead-time drivers identified process improvement opportunities as follows:

- Reduce part shortages
- Improve the quality of systems returned as trade-ins
- Implement process improvement to ensure work orders aren't left open after repairs are made (this is an example of information flow 'falling through the cracks')

The items above comprised the initial project plan: deliverables and/or actions required to achieve stability in the process. (Some actions were deemed 'quick wins' and helped to establish initial momentum on the project.)

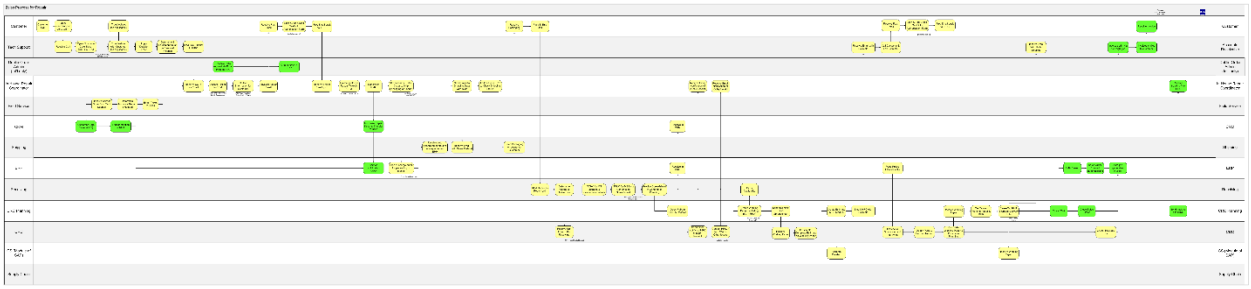
Another goal for the project was to accomplish greater throughput with the same number or resources. This also ties to complexity in the form of time…in this case, labor hours An analysis was performed to identify labor hour drivers:



While not quite an 80/20 distribution, we can at least attack specific product lines that contribute most to labor hours.

A subproject was therefore established to perform detailed value stream, process mapping & procedural reviews to eliminate any non-value added steps or over-processing for the top labor drivers. The goal of the sub-project was to reduce labor hours, establish targeted standard hours ('entitlement'), monitor and control to the established standard

Another key consideration in addressing high levels of complexity is to make the process visible. Using product line drivers as the focus, swim lane maps (information flow) and spaghetti maps (part, people flow) were created.



Swim Lane Map (spaghetti maps are not shown)

While constructing the swim lane and spaghetti maps with the team (and walking the process), problems/issues and opportunities were documented.

With this analysis, it became apparent several Kaizen events were needed to perform 5S, improve the physical layout, reduce floor space and optimize workflow. It was also apparent repair center technicians were performing non-technician tasks (specifically unpackaging and packaging units).

Complexity was therefore exposed through the mapping process, and complexity revealed itself as physical clutter, movement of parts and people, number of process steps, handoffs, loopbacks and delays in information flow. Note that documenting the complexity by mapping also provided a useful tool for simplification. Rather than talk about the intricate details of the process, process maps were continuously updated to further improve visibility and make simplification actions more apparent.

While several actions where identified, it was best to establish the go-forward plan as several sub-projects (summarized as follows):

- Streamline repair processes on top labor hour drivers
- Establish un-packaging and packaging as a process outside of the repair center
- Optimize the overall repair center workflow, physical layout and work areas (including 5S)
- Establish internal requirements (service level agreements) for repair center supporting processes (trade-in & spare parts processes)
- Implement a repair center Sales, Inventory & Operational Planning (SIOP) planning process
- Clarify repair center support staff roles & responsibilities and reorganize around process flow
- Establish financial metrics, reviews and financial priorities for the repair center value stream

A highly complex process was therefore analyzed and subprojects were successfully identified that would achieve the organizational goals.

We were not done yet, however. We then had a high level of **project** complexity that needed to be addressed.

This was accomplished through a project scoring process. Criteria was developed to score and prioritize the subprojects base on a desirability score. The criteria was:

- Impact on lead time
- Financial benefit
- Implementation timing
- Competency and skillset of project resources to execute the projects
- Project complexity

A project plan was created with the sub-projects prioritized using this criterion. This established a way forward for the client that effectively addressed the objectives of the improvement program, had the greatest impact and greatest likelihood of success.

In summary, key considerations for addressing high levels of complexity include:

1. **Measure** complexity (and its impact on the customer, usually lead time)
2. **Stabilize** (plan and execute projects or complete actions to achieve stability)
3. Identify **product line priorities**
4. **Make the process visible**
5. **Identify subprojects**
6. Establish **project priorities** (avoid getting overwhelmed by project complexity)
7. **Commit resources and execute projects to closure** (simplify the process)