

CASE STUDY:

Value Stream Mapping and Obeya: Key Enablers for Better Product Development

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For an organization to be continually relevant and profitable, it needs to develop products and processes that consistently create value. This can be done by:

- Being responsive to changes in the environment including technology developments, changing competitive landscapes, and the needs and expectations of customers
- Developing and supporting team members within the organization so they have the ability and skills necessary to be responsive to those changes

But how exactly do you create these new organizational capabilities and supporting leadership behaviors?

This case is the story of a wholly owned subsidiary of a Fortune 100 company, a producer of gas turbine generators (who we will call Turbine Gen), who began achieving these objectives through two development projects using lean principles in 2008-2009. It is the story of 17 months of learning and improving in one development project within one product family. There are no detailed explanations of lean tools here, but rather a focus on how Turbine Gen learned, improved, and adapted tools to enable its success.

COMPANY BACKGROUND

In 2008, competition was growing, technology was quickly advancing, and customer expectations were on the rise. Despite Turbine Gen's success relative to competitors, the company had been struggling to meet its commitments in terms of time-to-market, product cost, sales volume, quality, and budget. The director of product development (Ken) didn't want to add more structure and detail to the existing new product introduction process, which is a common approach to gaining control when commitments aren't being met. So he searched for other approaches.

Having experienced the benefits of lean manufacturing at Turbine Gen, Ken looked to lean product and process development as an opportunity to improve performance. He sought support for this new way of working from his leadership team and brought in an external coach. Their goal would be to establish two model line projects, enhancing cross-functional collaboration in product development using value stream mapping (method to understand and analyze the current state and design future state) and *obeya* (project management tool, which literally translates to "big room") to effectively manage the product and process development of a turbine uprate (upgrade to the power and efficiency of a turbine engine).

CHANGE THE WORK TO SUPPORT A LEARNING MINDSET

At Turbine Gen, even though they had some work to get there, lean product and process development was viewed as an organic process of getting the right people to work together as a team. It was about focusing on aligned objectives and knowing they would need to learn and adapt lean tools to best support their work. And at its essence, the leadership agreed this was first and foremost about demonstrating "respect for people."

	Respectful Environment
Right people	The people closest to the work know it best. Leadership's role is to support the people doing the value added work.
Understanding how work fits together	Aligned objectives enable the team to ensure their work moves the project forward in the same direction. Understanding the interdependencies of functions enables the team to understand how they impact each other.
Learning and adapting	Because every situation is different it requires learning and adapting to best support people in their work. As problems arise (as they inevitably will and do) people should be enabled to identify and solve them quickly and effectively.

Turbine Gen intentionally worked to establish an enabling bureaucracy by creating a management structure aimed at supporting employees in their work. To start, Ken identified a skilled project manager (Greg) to assume a role resembling Toyota's chief engineer. Greg had previous experience in engineering across various functions and industries. He had experience working directly with customers and downstream partners of the development process. Equally important, he had the interpersonal skills and emotional intelligence to know when to challenge team members and when to back off.

Greg became an avid student of lean product and process development, consciously working to develop himself as a coach. He acted as a "servant leader" enabling the team to effectively and efficiently collaborate, solve problems, and complete work. When organizational barriers arose, he was given the support he needed from Ken, who worked to remove organizational and functional barriers to this new way of working. This senior leadership support not only enabled the team to be successful in how they interfaced with others outside of the core project team, but conveyed to team members that this new approach to work should be taken seriously. All team members would be accountable to supporting each other, while also being given the support needed to work in this new way.

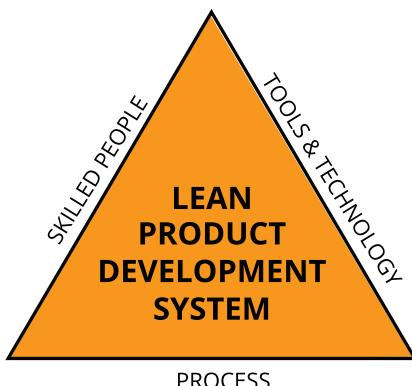
The team primarily learned by doing while executing the turbine uprate project, developing their capabilities with coaching from Greg the project manager and the external coach. The core project team had representatives from the functional areas involved with the development of the turbine uprate, including engineering functions such as design, manufacturing, tooling, and packaging as well as non-engineering functions such as sales, marketing, and customer service. All team members pulled knowledge from each other, external resources, and other reference material. In this particular case, Turbine Gen intentionally adapted components of The Lean Product Development System model, as described by James Morgan and Jeffrey Liker in *The Toyota Product Development System: Integrating People, Process, and Technology*, with the direct support of their coach:

ENABLING BUREAUCRACY

Enabling bureaucracies use rules, procedures and structure to support the work of employees. Whereas coercive bureaucracies use rules, procedures and structure to control employees to ensure that they do the right thing (Adler 1999). An approach designed to help employees determine if the process is operating to standard, help them solve problems that inevitably occur, and help them identify improvement opportunities will support an enabling bureaucracy (Adler ,and Borys 1996).

LEAN PRODUCT AND PROCESS MODEL AND 13 PRINCIPLES

5. Develop a "Chief Engineer System" to Integrate Development from start to finish.
6. Organize to balance Functional Expertise and Cross-functional Integration.
7. Develop Towering Technical Competence in all Engineers.
8. Fully Integrate Suppliers into the Product Development System.
9. Build in Learning and Continuous Improvement.
10. Build a Culture to Support Excellence and Relentless Improvement.



1. Establish customer-defined value to separate value added from waste.
2. Front-load the product development process to thoroughly explore alternative Solutions while there is Maximum Design Space.
3. Create a leveled Product Development Process Flow.
4. Utilize Rigorous Standardization to Reduce Variation, and Create Flexibility and Predictable Outcomes.

11. Adapt Technology to Fit your People and Process.
12. Align your Organization through Simple, Visual Communication.
13. Use Powerful Tools for Standardization and Organizational Learning.

Turbine Gen focused on two main areas:

- Managing the development pipeline – leveling of product launches and engineering resources, which enabled resources to be front-loaded without creating overburden
- Adopting lean principles in product and process development projects including front-loading projects in the concept phase (initially in two projects, one of which is being discussed)

VALUE STREAM MAPPING AND OBEYA FOR CROSS-FUNCTIONAL COLLABORATION

In complex environments like product and process development, one of the biggest barriers is simply quick and effective cross-functional collaboration and problem solving. When it came to tools, Greg introduced value stream mapping and obeya to overcome this barrier in a way that would start the cultural transformation he knew his team needed.

First the team did a value stream mapping workshop to understand their current reality and begin putting in place components of the Lean Product Development System model. As the turbine uprate team's capabilities developed, Greg introduced additional components of lean product and process development as appropriate to support the turbine uprate program.

Value Stream Mapping

Value stream mapping was the first step as it would help the team understand what to improve. The core project team dedicated three days out of their regular schedule to value stream mapping only, knowing this time spent would more than make up for any "time lost" later. The cross-functional team, including many functions not usually involved this early in the project – sales, marketing, and customer service, gathered for a value stream workshop to create:

- a current state value stream map for the project, (identifying value-added activities and waste)
- b) a future state map that would reduce the lead time to reach Turbine Gen's time-to-market target.

The future state map would become the initial overall project plan.

The team's current state map was created based on similar and recent projects within the company that had taken between 24-27 months to complete. The map was like a matrix with time across the top and swim-lane columns each focused on the work done within a function. It gave visibility and fostered conversations about team members' tasks, process waste, and interdependencies of the work across functions helping people understand the current situation including common problems – this in turn gave people the knowledge needed to plan their own work with an understanding of how their work fit together.



Current Product Development Process

This approach was a radical departure for Turbine Gen. In planning projects, they had previously done what most companies do: assign a project manager to create the project plan start to finish. To do this well, this person would need to understand all tasks involved, all people involved, and the interdependencies across the project, which for one person is impossible. The VSM workshop was a respectful way for the team to work together that also removed an unrealistic burden of keeping track of all interdependencies from the project manager.

In the VSM workshop, the team didn't only identify waste, but *problems driving the waste*: batching, lack of scope clarity, scope creep, work within functional silos, and communication breakdowns. Identifying these waste drivers enabled team members to create countermeasures to mitigate problems *before* they occurred. These countermeasures, which included many components of the Lean Product

Development System model, were designed into the future state map. The team set a cadence with work leveled throughout the project. Together they identified key decisions that needed to be made, when they needed to be made, and with what information. This enabled them to make decisions with as much information and knowledge as possible without delaying the project.

The team "designed in" process flow with simultaneous engineering, front-loaded resources including early supplier involvement, and an extended concept stage.

- Design engineering leveled the flow of when drawings were released based on part lead times, not in batches at formal release deadlines as is typically done.
- The team leveled project deliverables to not overwhelm suppliers.
- The team planned for downstream activities including tooling development, prototype casting, and manufacturing preparation early in the process.
- Key suppliers were involved early in the program including one of the most critical suppliers (of castings) having a full-time, on-site representative on the core project team.

The combination of these activities allowed for the downstream process to be much more stable and level than in past programs focusing on execution with many historical downstream problems (cost, performance, producibility, and quality) avoided.

Team members took ownership and accountability for their work plans and commitments made to each other while creating a plan with a goal to complete the project within 18 months (far ahead of the 24-27 months a project like this would typically take). The drastically reduced timeline wasn't planned with increased resources, but – and most importantly – based on understanding how the different aspects of the project fit together.

OBEYA

Once the cross-functional team created the project plan, they needed a way to check the plan, adjust as necessary, and continue to identify problems quickly. Here is where the project management tool obeya and weekly obeya meetings came in. This gave team members a regular cadence for meeting to check and adjust their plans.

Greg led the obeya meetings through a process called "walking the walls" by which team members shared information from their section. These meetings helped the team identify cross-functional issues and problems, which they could then address and solve between meetings. Through this process a resolution or plan for progress towards a resolution was expected by the next meeting. Among its many benefits, the obeya enabled clarity of deliverables, showing who exactly was accountable for individual pieces of work. This let individuals coordinate their work and understand its impact on the rest of the project if they missed a commitment.



Future State Product Development Process

Within the obeya, all of the information that team members thought was relevant to the project was prominently displayed, which created both transparency and positive peer pressure. It also made clear when key information for the project was not posted; the absence of data allowed problems to be addressed before they turned into problems. People used construction signs to acknowledge known gaps – items they had not yet addressed or had questions about in other functions. People could ask questions by looking for and pointing to relevant data in the room. This style of presenting made it clear that information wasn't being manipulated to show the project from a particular angle, which increased overall trust. Having all of this information displayed "lowered the walls" between functions, fostering much greater and more meaningful collaboration.

Displaying data visually enabled alignment across separate functions. Team members came up with clever ways of calculating key metrics and presenting them visually, including the cost of the product, which allowed visibility to "actual" versus targets on a weekly basis—visibility they had never had before. When design engineering considered making a change, manufacturing engineering was able to highlight how it would impact the overall cost. Design engineering then decided to pull back and not make the change with a new awareness of how it would impact other aspects of the project. Visibility across functions through the obeya enabled not just better decision-making, but also accountability to be placed at the location where the best knowledge existed and decisions were really being made.

In fact, the obeya became so useful that the group decided not to hold the usual gateway reviews as they had previously done through extensive Power Point presentations. Instead, senior leaders came to the obeya to observe the status of the process at the gateways.

The team continuously improved both the obeya room and their weekly meetings throughout the project. As the group matured and the obeya improved, the length of the weekly meetings decreased from 90 minutes to 45 minutes with increased efficiency and improved effectiveness. Their progression is perhaps best easily understood as progressing through three phases over the course of the 17 month project.

Obeya: Phase 1: Empowering the team to work in a new way

Greg initially only labeled the walls by sections owned by each function, leaving room for team members to include any information or tools that they felt would enable them to better do their work. In the beginning, this resulted in a tremendous amount of information being displayed, and while it helped individual functions do their work, the sheer amount of information meant that it wasn't clear how all of the different functions' information fit together. So Greg acted as a coach encouraging team members to experiment with tools and what was shared, giving credit where it was due when they were most effective. This simple practice encouraged other team members who were resistant or struggling to run some experiments using tools. Team members used puzzle pieces to show how everyone has a piece of the project that fits together to form the overall project. At this stage the obeya was effective for supporting the work of the team, but it was still difficult for people outside of the team to understand the work that was going on.



Obeya Room

To work toward the state where other people could easily come in the obeya and understand the story of the larger project, Greg brought category signs in such as "financial" and "quality". He encouraged people to put up these categories if they applied to their part of the project. Additionally, if it applied to them, but they hadn't addressed it yet, he encouraged people to put up a construction sign to give visibility that the pertinent function accepted accountability for the category (financial or quality) and it would be addressed in coming weeks.

In this first phase of the obeya the team was actively engaged in the weekly meetings and gradually took more and more responsibility for their work by showing ownership of various functions and tasks.

Obeya: Phase 2: Standardizing and creating accountability

The transition between the first and second phase of the obeya process represents the point when it was clear that the project had obtained engagement from participants and was exceeding the performance of an average project. At this stage, it became clear not just to the team, but to other leaders that this new way of managing product development could yield impressive results for Turbine Gen. People became more vocal and supportive of tools when they helped them do their job. People started using the best tools created by others so frequently that the team eventually established a degree of standardization of tools across functions.

One tool that was developed by one person and later adopted as a team standard became known as "Jack's Chart". Jack, a manufacturing engineer, created it to provide a visual display of deliverables, status, and who was accountable for the work. More and more people started using Jack's chart as they found it to be valuable. The chart relied on a color coded scheme for deliverables:

- **Cool mint green** – On schedule, no work in process
- **Dark green** – In process
- **Dark green with check mark** – Complete
- **Yellow** – Risk identified, team working on a resolution
- **Red** – Risk identified, resolution requires outside / management support

A tool like this makes it visually evident what is being worked on

and what is planned to be worked on. The best part was that it was created by a team member responsible for the work and thus was owned by the people accountable for the work rather than imposed by someone else. Jack's team members helped him improve the tool, so it quickly became the team's tool, not just his. "Pam's cool mint green", was used to represent things that are on schedule, but for which there was no work in process. This served to distinguish from the dark green used to represent work that was on schedule and in process. Referring to it as "Pam's cool mint green" credits Pam for the improvement. The team used Jack's Charts to translate the work schedules they came up with in the value stream mapping process into individual work plans and to establish a standard that they could easily check and adjust toward on a weekly basis.

Though the room functioned well, there were still opportunities for improvement. There was still a good amount of extraneous information on the walls, information that wasn't as technical as it needed to be or wasn't relevant. This created noise and confusion, and as a result, there were some cross-functional issues that were missed. The visual management within the obeya wasn't working as effectively as it could for those outside of the project to see what was happening with the project. At this stage, all of this was normal. To gradually solve this problem, Greg posted the high level status of the project on the door of the obeya, so it could be quickly seen. For greater detail, people could walk into the room and find more information to understand what was happening. Throughout this phase the team was performing well and tools were being developed, adopted, and improved upon across the entire project team.

Obeya: Phase 3: Enabling "management by exception" through visual management

In this next phase of the obeya room, to overcome weaknesses with issues not being highlighted, the team added "Andon lights" (signal that help is needed for a problem) to show the status of the project and individual plans. These signs were red, yellow, or green. Green represented things were on track, yellow that there was an issue being addressed by the team, and red that there was a problem that required help from outside the core team. This allowed managing by exception as things that were green didn't require discussion and efforts could then be focused on the yellow and red issues. The use of Andon lights at this stage of the project had a dramatic effect on the functioning of the weekly meetings within the obeya. Prior to the use of Andon lights

PART NUMBER	RTTP#	ITEM SETUP	ONLINE ENG	OIS	BAAN ROUTING	SFIS ROUTING	BAAN TOOLING	SFIS TOOLING	TAGM TOOLING	Control	ME Responsible
370200-1 (earlier Ring)	MFC0		✓	1-Aug	1-Aug	1-Aug	1-Aug	1-Aug	1-Aug	J/V	
370231-100	PURCHASED		✓	RFQ						J/V	
370231-100	MFC0		✓	DCL-P	██████	30-Jun	30-Jun	15-Jul	15-Jul	J/V	ND
370231-12nd Step, New Seal	SET TO INACTIVE										INACTIVE
370231-12nd Step, New Seal	PURCHASED		✓	DCL-P	██████	30-Jun	30-Jun	15-Jul	15-Jul	J/V	ND
370231-200 2nd Step, New Seal Accy (Base)	MFC0		✓	DCL-P	██████	15-Sep	15-Sep	1-Oct	1-Oct	J/V	ND
370231-200 2nd Step, New Seal Accy (Base)	PURCHASED		✓	DCL-P	██████	15-Sep	15-Sep	1-Oct	1-Oct	J/V	ND
370231-200 2nd Step, New Seal Accy (Base)	PURCHASED		✓	DCL-P	██████	15-Sep	15-Sep	1-Oct	1-Oct	J/V	ND
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370231-200 2nd Step, New Seal Accy (Base)	PURCHASED		✓	DCL-P	██████	15-Sep	15-Sep	1-Oct	1-Oct	J/V	ND
370231-200 2nd Step, New Seal Accy (Base)	Set to DO NOT PUR INDIA PUR COMPY										INACTIVE

Jack's Chart

"When people are meeting frequently in the obeya, it helps them all stay on the same page and see the bigger picture of how their work fits in."

- Carlos, Core Team Member

there would be a lot of off-topic conversations occurring during the meetings. After the Andon lights had been introduced, conversations focused on problems *as soon as they were evident*.

CONCLUSION

Value stream mapping and obeya made it easy for the turbine uprate team to see cross-functional interdependencies and problems, which enabled Greg to "manage by exception." It helped the team understand when and how to collaborate. As a result, the team's cross-functional time was only spent identifying if something was *off-target* (schedule, cost, and quality) and needed to be addressed rather than spending time discussing tasks that were on-target. This direct attention to issues that needed to be resolved allowed people to focus their attention and energy on just the most critical issues.

When a problem did occur, the team identified the issue as well as those who needed to be involved in resolving it. The right people were then able to meet outside of the obeya meeting to solve the problem. Such a process respects the time of people who do not need to be involved in solving the problem by allowing the entire team to continue the meeting. It wasn't uncommon to see smaller groups of two or three people gather to discuss the issues that just they needed to resolve together immediately following the weekly meetings. This happened naturally as a result of seeing and understanding the interdependencies of their work.

Turbine Gen began by purposely using value stream mapping and obeya to drive a cultural transformation. Turbine Gen's cross-functional project team learned how to understand how their work fits together, how to co-create a project plan, and how to solve problems that emerged in the uncertain environment of product development.

Over 17 months, with Greg's coaching helping team members develop their individual and shared capability for working together more effectively through obeya, the team increasingly acted in a more aligned fashion. Greg focused his energies on understanding each team member's engagement to this new way of working and when there was resistance, ask why. This informed his adjustments and improvements as a coach. Improvements to the obeya emerged when the team and individuals were ready. Greg helped team members see the value of lean tools to support them in their work with an emphasis on learning – always using the tools that were most effective for the team.

With quick learning cycles, coaching, and management support, team members were able to efficiently and effectively do their work and solve problems. Team members helped each other identify and solve cross-functional problems that they may have missed without the visibility and cadence of the obeya. With weekly checking and adjusting, the team was able to finish the turbine uprate project in 17 months ahead of the original 18 month plan (and much quicker than the 24 -27 months similar projects usually took). Even a major tooling crisis, which would have delayed the project 3 months, was dealt with effectively as the team came together and dedicated themselves to solving the problem, allowing them to still meet a shortened delivery date. By being able to complete projects with a greater than 25% lead time reduction, Turbine Gen is now able to be more responsive to inevitable changes in the external environment.

The benefits for Turbine Gen didn't end after 17 months. The organization and individuals continue to develop their capabilities and spread the benefits of lean across the organization. Model line projects served as learning laboratories for others to explore and learn from. People involved in these projects began to spread the management approach they were experiencing and the tools they were using to other areas and to other work. Through developing and supporting people to identify and solve problems *while* executing projects with reduced lead times, Turbine Gen today is able to be more responsive to changes in customer expectations, competition, and technology developments. In this way, purposefully using tools to support and develop people, they increased organizational capability for building relevant and profitable value streams well in the future.

References

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MANAGING BY EXCEPTION

Managing by exception only focuses on an issue when it deviates from the plan. This approach is more efficient and can be more effective than approaches where everyone gives status updates. These updates can be time consuming and with the amount of data shared make problems difficult to identify. By only discussing problems (deviations from the plan) energy and attention are directed to where they need to be. For managing by exception to work there needs to be a realistic plan and a culture where team members are willing to identify problems and are supported in solving them.