SupplyVelocity®

A Lean Product Development Process

Using Stage-Gates to Speed the Development Cycle

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Abstract
How many products hit the market and are too expensive, too big, don't have the desired features or take too long to develop?

Lean is a Process Improvement Tool to reduce waste in organizations. Few processes cross over as many different departments in a company as product development. Product development can include hard-goods, software or new services. As the efforts cross marketing, research, engineering, purchasing, operations and sales there are numerous opportunities for the product development effort to stall or reverse direction. This can be due budget problems becoming visible; product definition being rushed and/or the operational problems.

By applying Lean concepts to product development, you can create profitable products faster. However, before you do, you will have to learn that sometimes slower is faster.

The Lean Product Development Process

- Return on Investment Analysis
    - Stage-gate
- Marketing Specification
    - Stage-gate
- Concept Design
    - Stage-gate
- Design Product or Service
    - Stage-gate
- Pilot Manufacturing Run (if applicable)
    - Stage-gate
- Field Test
    - Stage-gate
- Launch Marketing Plan
- Review Product Profitability versus Plan

Each stage of the Lean Product Development Process will be explained. However, more important than each individual stage is the concept of the "stage-gate". A stage-gate is a place in the process that, after everyone signs-off, they cannot go backwards.

Initially, stage-gates can seem to slow down the process. Until the department or team downstream of a stage-gate accepts the input to their stage of the process the effort cannot go forward. However, this will actually make the process faster, and much more effective, because it creates accountability and eliminates the possibility of getting a product that is too expensive, slow, large, etc. from getting to the market. Products are designed to sell profitably and launch when scheduled.

The other importance of the stage-gate process is that as product development progresses, it gets more expensive. Final design requires more time and resources than concept design. Pilot manufacturing is a significant expenditure due to tooling requirements. Finally, the launch of the product is most expensive of all stages, as the company will be spending money to market the product and will most likely begin marketing expenditures.

Return on Investment Analysis

This stage is the primary responsibility of the Marketing Team. They will:

- Understand the need
- Create the concept
- Develop sales forecast
- Identify cost targets
- Work with Research and/or Development/Engineering to define the product development budget and timeline
- Present financial return on investment for approval

This initial stage creates the financial case for developing this product or service. By creating the sales forecast based on initial cost targets, the Marketing Team takes responsibility for the final sales and profits that result from this product development effort. Because Research and/or Development/Engineering is involved they get early buy-in and communication on the concept.

Once this stage-gate is passed the company agrees to move forward with the concept design. Management can kill the effort at this point or give its approval to move forward to concept design.

Marketing Specification

The Marketing Product Development Representative will define their requirements for the product or service. This may include:

- Critical dates
- Development budget
- Target market and application
- Performance specs
- Functional requirements
- Appearance/Size specs
- Unit-Sales expectations
- Regulatory standards
- Competitors' products
- Life expectancy
- Determine field-test sites

When the Marketing Rep documents this list of requirements they will meet with Research or Development/Engineering, who will sign-off and accept this as their concept design input. This is another stage-gate. Now the project is in the hands of the Research or Development/Engineering Team to create their conceptual design.

Concept Design

If this product involves innovative technology, then typically the Research team will be responsible for concept design. Research would be responsible for handing the Development/Engineering team a "developable" concept design. If the product is an extension of existing technology, then typically it moves right to the Development/Engineering team.

Research or Development/Engineering will brainstorm possible designs and create mock-ups of this design if needed and budgeted. They may work with purchasing to gather preliminary vendor costs. The output of this stage is a conceptual design (which can be a drawing, 3-D model, service or software demo), estimated cost, design timeline and test data if appropriate.

At this stage-gate Marketing, Development/Engineering and Operations must sign-off on the conceptual design. If they reject it, then the team responsible for concept design has to refine the concept. This may involve changing the appearance, cost, functionality, etc.

Design Product

This stage is the responsibility of Development/Engineering with input from Purchasing and Operations. This stage includes:

- Create detailed design budget and timeline
- Finalize design
- Run failure mode & effects analysis (FMEA)
- Create detailed demo, model and bill of material
- Create work breakdown structure
- Choose components and select vendors (working with purchasing)
- Produce prototype
- Document test requirements
- Design packaging
- Create initial customer manuals
- Determine final cost

When this is complete and the prototype is produced or procured there will be a stage-gate approval meeting with Sales and Marketing. They must approval the cost, appearance and functionality.

Pilot Manufacturing Run (If the product is a hard-good)

Pilot manufacturing is a collaborative effort between Development/Engineering, Purchasing and Manufacturing. While design-for-manufacturability may have been used during final design, this stage represents the transfer from Development/Engineering to Manufacturing. Vendors and Manufacturing are tooling up to produce parts. When the pilot manufacturing stage is complete Manufacturing is expected to have completed all production and testing documentation (standard operating procedures).

Field Test

- Install product at customer field test sites
- Run product
- Evaluate results with Marketing
- Make changes if necessary
- Finalize customer manuals

Pilot run production prototypes are sent to field-test sites. The purpose of this test is find problems. These problems may include quality issues, durability, functionality, installation, etc. Hopefully none are found, but if we were 100% confident of this, then field-testing wouldn't be needed. Some organizations have separate Field-Test groups. Often field testing may be done by Technical Service teams or can be managed by Development/Engineering.

Marketing Launch

- Review launch schedule
- Distribute promotional material
- Distribute training material if applicable
- Train Sales Force
- Train Customer Service
- Review initial customer service data
- Provide feedback to Development/Engineering and Operations

Once field testing is complete and the design in locked down, the company is ready to start selling. Selling must be preceded by training for sales reps, customer service and customers. The selling process must be planned like all other steps in the product development process.

Evaluate Results

The last step of the product development process is to evaluate results. This is often-overlooked. Many companies accept the results they are getting. The most successful companies evaluate the actual results to their original budget. If sales are under budget then they evaluate why and make adjustments to the next product development effort. If sales are over budget then this too is evaluated to understand what led to this success.

The Role of Documentation in Product Development

- Task
- Primary Department Responsible
- Specific Person Responsible
- Measure of Success Description
- Documentation of Success

It is important to document the product development process. While we don't want to create un-necessary paper or electronic files, there needs to be proof that each step of the process is done successfully and a clear definition of what success means.

The actual product development process is usually a minimum of 100 discreet steps. More complex products are far more detailed. Therefore, we need to define what documentation clearly shows that each step was successfully completed. The bullet points above provide the minimum information we expect to see on the Product Development Checklist.