

What Toyota can Teach you About Accelerating New Product Development



Should a company beat its competitors to market with a product that falls short in some areas, or delay a launch to enhance features or to reduce risk?

Companies often struggle to reconcile these two requirements. When the product development schedule slips, relationships among stakeholders often turn adversarial. Product marketing complains that engineering takes too long to develop new products. Engineering retorts that product scope changes keep projects stalled. This finger pointing often continues while the projects move forward slowly.

Toyota has a different approach to new product development, which it bases on Dr. Edwards Deming's groundbreaking principles for quality and operational excellence. The Toyota Production System (TPS) is the global automaker's own process to reduce waste and enhance performance.

At a high level, successful companies in any industry must outmaneuver their competitors through innovation, cost efficiencies, and time to market. Understanding how Toyota's new product development engine operates can help executives to improve their own processes.

Start Slow

Toyota focuses on identifying and resolving all potential problems early in the product development process, which takes time due to ambiguity in some product requirements. The company typically builds consensus by assigning cross-functional product development teams to solidify product requirements.

Guided by an overarching focus on customer needs, Toyota manufacturing engineers produce a detailed checklist of what they can achieve within the project scope. The checklist serves as the basis for communication among all internal stakeholders. Importantly, it also broadly defines the design space and gives the team room for creativity.

Test-Drive Ideas

The new product development process can be as diverse as the ideas themselves. Increasingly, many companies are centralizing at least part of their product development capabilities. In 2014, Newell Rubbermaid

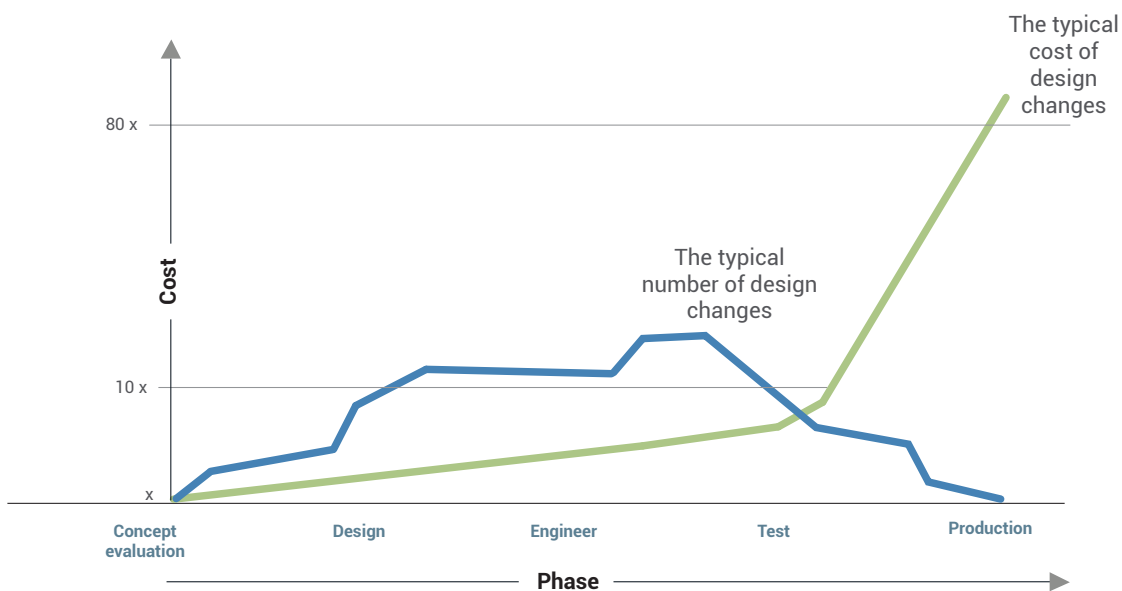
brought its 15 industrial design and product prototyping groups under one roof to help cross-pollinate ideas among its brands.

General Electric (GE) is also establishing technology-specific innovation centers to take ideas from concept to commercialization. Similar to Toyota, GE's cross-functional project teams include marketing, industrial design, mechanical engineering, software engineering, and manufacturing.

Despite the differences in new product development processes, successful products have a common trait: they were created by teams who had the latitude to test and experiment. Teams are the most effective when they have the space to develop, refine, and evaluate multiple options with analytical rigor. This process helps to validate or challenge early assumptions, and enables teams to rethink their approach.

As far back as the 1960's, M.I.T. Professor Thomas Allen found that engineers in an industrial market conceived

Figure 1: Charting the Cost of Engineering Changes in the Automotive Industry



Source: CIMWare

multiple options during the course of a project. Preferences changed frequently as the team used the latest test results to inform next steps and spur new ideas¹. Newer research on this topic spotlights the importance of down selecting ideas quickly by “failing early and failing fast.” By identifying and eliminating poor options early, companies can focus more time on viable alternatives.

Speed Through Engineering and Testing

Confident that its early-phase work is accurate, Toyota limits engineering changes later in the product development process. A Toyota Camry platform project manager took this philosophy a step further by implementing a “Zero Engineering Changes” policy that prohibits additional engineering revisions once production drawings are released. This approach, combined with the adoption of advanced simulation technology, reduced Toyota's development cycle from 36 to 26 months.


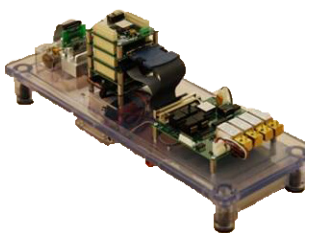
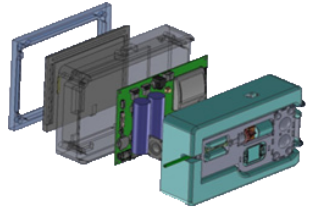

While all manufacturers understand the costs, delays, and disruption of late engineering changes, few have learned to limit them. In the automotive industry, for example, the impact of changes increases by an order of magnitude at each successive development stage (Figure 1).

Apply TPS to Your Business

Companies need to follow their phase-gate product development process vigilantly to mitigate these challenges.

Applying Toyota's blueprint for success to the product development phase-gate process requires in-depth research and the time to conduct careful analysis in the first two gates (Figure 2). This includes conducting a detailed usability assessment and developing comprehensive product specifications. Added due diligence at the beginning of a project ultimately reduces product development time and costs. In other words, slow down to speed up.

Figure 2: ISO Phase-Gate Development Process

Gate 1 - Initiate	Gate 2 - Formulate	Gate 3 - Develop and Verify	Gate 4 - Manufacture and Validation Support
Device is ready to transfer from concept to active project status	The device's technical feasibility is proven and product development can begin	Design outputs satisfy design inputs and have acceptable design risk levels	Validation testing confirms design outputs satisfy design inputs - user needs are met
			

Eight Steps to Refining Your Innovation Process

To accelerate product development, incorporate TPS elements and include the following steps:

1. Define the market requirement and the features required to address market needs
2. Perform usability assessments to understand all stakeholder needs: customers, partners, distributors, etc.
3. Innovate based on a product specification that incorporates usability assessment findings
4. Eliminate ideas that introduce unacceptable risks for the current product version
5. Conduct an honest corporate self-assessment to understand and communicate organizational skills and capabilities
6. Dedicate time early in the process to eliminate ambiguity among user needs, marketing requirements, and product specifications
7. Prioritize product specification resolution based on:
 - Documented user needs
 - Organizational/functional capabilities
8. Overcome hurdles to satisfying user needs by developing new processes, and/or utilizing outside product and/or process development support

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About Boston Engineering

Boston Engineering improves the way that people work and live through innovative product design and novel engineering. We manage the entire product development process – from ideation to supply chain development. Certified for ISO 9001 and ISO 13485, our industry expertise includes consumer products, defense & security, medical devices, robotics, and industrial & commercial products. Boston Engineering is also the Northeast's largest PTC software reseller.



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¹ Harvard Business Review, "Six Myths of Product Development" (May 2012)