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The Product Manager

Great products are the lifeblood of every technology company, whether young or mature. Product managers can have a tremendous impact on a technology company's ability to develop great products. The product manager (PM) role is demanding and complicated. An effective PM is an entrepreneur, strategist, technical visionary, cross-functional team leader, customer and end user advocate, all rolled into one. In short, their primary role is to define the customer experience.

This note provides an overview of the product manager role in technology companies both large and small. The first section reviews the responsibilities of the PM. The second section describes different ways in which product management may be organized and explains how the work of PMs relates to that of other functions. The third section lists ways in which the PM role differs according to context, for example, in startups versus established companies. The note closes with a discussion of the attributes of strong product managers.

Product Manager Responsibilities

A product manager has two primary responsibilities: (1) defining the new product to be built; and (2) managing its development, launch, and ongoing improvement. To fulfill these responsibilities, a PM leads a cross-functional team. Typically, however, none of the team members report directly to the PM. Hence, a PM has considerable responsibility but little formal authority.

A product manager's domain will depend on the nature of her company's product line. Many PMs are solely responsible for a single product. However, some PMs oversee one of several components of a complex product (e.g., algorithms for sourcing or pricing books for the online textbook rental company Chegg). Others manage a set of related products that share common components or customers (e.g., PayPal's offerings for online merchants). PMs may also be responsible for strategic initiatives that cut across multiple products, for example, improving growth, customer retention or expanding internationally.

Defining Products

The first steps in product definition are identifying an entrepreneurial opportunity and then confirming that it is attractive; specifically, that the proposed new product -- or improvement to an existing product -- will be *desirable* to potential customers, technically *feasible* to make, and

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economically *viable*. Next, after a company has decided to develop a new product, a product manager leads the iterative process of specifying the product's functionality, so that engineering can begin building it. This process will typically include collecting and defining product requirements, prioritizing these requirements, creating a roadmap that includes the creation of a minimum viable product (MVP) to fulfill these requirements and then managing the entire cross-functional process during product development.

Identifying and Evaluating Opportunities

Early-stage startups are formed to pursue opportunities identified by their founders, one of whom, as noted below, typically plays the role of both CEO and product manager, at least until her workload becomes overwhelming and a product professional is hired. In more mature technology companies, the core idea for a new product can come from senior management, product management, or any function, including sales, marketing, business development, or engineering.

To better identify and evaluate new product opportunities, product teams will often engage in what entrepreneur-turned-educator Steve Blank, in his seminal book, *Four Steps to the Epiphany,* calls "customer discovery and validation."[1] The objective is to figure out whether the product is worth building, in particular, whether potential customers have unmet or partially met needs for the solution envisioned. Disciplined organizations invest heavily in upfront customer discovery and validation to avoid wasting software development resources. The PM's task at this stage is similar to that of an entrepreneur in the earliest stages of launching a new venture. For more detail, see the notes, "Hypothesis-Driven Entrepreneurship: The Lean Startup," HBS No. 812-095; "Business Model Analysis for Entrepreneurs," HBS No. 812-096; "Customer Discovery and Validation for Entrepreneurs," HBS No. 812-097; and "Customer Visits for Entrepreneurs," HBS No. 812-098. See also Marty Cagan's book on product management, *Inspired,* which provides deeper perspective on many topics covered in this note.[2]

When identifying product opportunities and conducting an initial evaluation, PMs collect market data and solicit input from their sales team as well as direct customer feedback from a variety of sources, including focus groups, on-site customer interviews, and customer surveys. To help brainstorm and test product concepts, MIT's Eric von Hippel suggests seeking out "lead users," sophisticated customers skilled at identifying needs ahead of the market.[3] Many organizations form customer advisory councils to point out trends and developments that can yield new insights into future products. Firms also seek input from users in adjacent industries who can provide an outsider's perspective that may stimulate creative solutions.

But customer data can only go so far. Often, great products solve problems that customers are not aware of. To gain insight, PMs immerse themselves in a customer's environment to develop empathy for their needs and identify the "pain" that the product might address. For example, Bunk1, a social platform for summer camps that helps parents and campers stay in touch, has its managers stay overnight at sleepover camps to get product ideas.[4]

The PM's output at this stage can take a range of forms. In a young company, the output may be nothing more than a few PowerPoint slides that describe the product vision. A product vision articulates the core customer needs to be addressed, the broad elements of the proposed solution, how the product will evolve over time (also known as the product road map), and a few major themes for each product release.

Whereas informal documents and high-level product road maps are the typical outputs for PMs in a startup, more mature companies typically engage in cross-functional coordination when evaluating

ideas for new products, and hence often require more rigorous processes and upfront documentation. In a mature company, the PM's initial output might take the form of a detailed description of the customer's requirements in the context of their environment and their level of satisfaction with current solutions, known as a market requirements document (MRD). In an MRD, the PM must also confirm that the new product is consistent with the company's strategy and business model—or justify a departure. In some cases, the PM must develop the preliminary business case to support further investment, perhaps in the form of a streamlined business plan. Elements of this plan may include pricing, competitive analysis, the go-to-market strategy (e.g., direct sales, telesales, channels, international), and multiyear sales and profit forecasts.

Specifying Requirements

Having determined that a new product is worth pursuing, the next step is to specify product requirements, so that engineering can start building it.

Established technology companies typically have product principles that guide and constrain new product designs and inform feature-prioritization decisions.[5] For example, must a new software version be backward compatible with older versions? Will an e-commerce company give merchandising preference to its own inventory versus products available through partners? Can a product sacrifice speed in completing basic tasks for greater functionality? In some organizations, such principles are explicitly documented (e.g., Google's "Ten things we know to be true"[6]). In others, they are communicated informally.

Based on these principles, the product manager must define product requirements in enough detail to allow engineering to commence development. There are two broad approaches to defining requirements:

Prototypes and Stories.

Many companies, particularly young ones, define product requirements by developing a working, "high-fidelity" prototype (in product development, "fidelity" refers to how closely a prototype corresponds to the intended product) or even a simple "wireframe" (which consists of screen-by-screen representations of the high-level pages, layout, and flow that the product might incorporate). Engineers often have a much clearer sense of what to build if they can first see a prototype in action. Prototyping helps a company get input from potential users on whether the prototype meets their needs, and it allows a company to learn how product components must be integrated. PMs will also work closely with user experience (UX) designers (described below) to develop these prototypes and to specify the required functionality. A prototype is often augmented with descriptions of typical users, called "personas." Stories—descriptions of the persona completing a key task—are often written to help bring the persona's needs to life for the engineering team. For example, "Melody is a working mother in her 40s with zero free time. As a result, she finds it impossible to find the time to run even the most basic errands, such as picking up dry cleaning or much-needed groceries to make the daily school lunch."

Product Requirements Document (PRD).

A PRD is a detailed document that describes how customers will interact with a product, specifying the functionality needed to fulfill a comprehensive set of "use cases," that is, all the different tasks that customers will complete. The PRD will often incorporate wireframes and stories but tends to be more detailed and formal than the prototype. The PRD has multiple audiences: engineering, quality assurance, customer service, sales, product marketing, and so on. Hence, the

document must communicate product functionality in ways that provide necessary direction to all groups. Most functions then translate the PRD into a work plan for their own group. For example, the PRD gives guidance to engineering on what to build, but not on how to build it. Engineering typically will prepare a product specification document or engineering design document that describes the architectural approach it will employ (e.g., how it will modularize the product); software languages and programming tools it will use; and the staff time required to complete key tasks. For engineers, the more detailed and specific the PRD the better, particularly for complex products. A common frustration for engineering is that the PM's output is too high level and leaves too many open questions to fill in. Smaller teams can manage through some amount of ambiguity through ad hoc communication between engineers and PMs, but larger organizations require greater detail in the PRD.

These approaches are not mutually exclusive; many companies rely on a blend of these two approaches, and the level of detail often depends on the scope of the product or feature. Regardless of how they develop product requirements, most companies incorporate direct end-user feedback into the process. This can take the form of customer interviews to gain reaction to paper prototypes or wireframes and even the release of an MVP, the sole purpose of which is to test an initial hypothesis about whether product-market fit can be achieved as opposed to providing a fully featured product.

Negotiating Resources, Setting Priorities

Once the requirements for the product have been identified, they need to be prioritized, and the necessary resources needed to build the product must be negotiated. This is a difficult task for PMs to navigate as they frequently need to reconcile competing interests. For example, the CEO may have great urgency to launch a particular feature enhancement that is consistent with the company's strategy and competitive position, but the head of engineering may be focused on ensuring stability and scalability in the current product, which requires shoring up the architecture and fixing bugs rather than introducing new elements. For the PM, the challenge in this phase of the process is to satisfy all the various constituents while staying true to the original product vision. One PM refers to this process as figuring out how to "shove 10 pounds of manure into a 5-pound bag."

There are several techniques that can be used to help set product priorities and fit them into the reality between development schedules and engineering resources. For example, the PM can make an ordered list of the feature priorities, even scoring each priority from high to low. Alternatively, the engineering team can provide an estimate of the level of effort required for each feature. These estimates can be as precise as person-days of work or more broadly categorized as "high," "medium," and "low." Even the act of scoping features and providing estimates costs precious engineering time, so it is not done lightly. Because engineering estimates are subjective, PMs need to judge whether their engineering team tends to be overly aggressive (in which case, they need to build in some additional cushion in the schedule) or conservative (in which case, they need to push the team to be more aggressive). In the end, deadlines are estimates with complex trade-offs and thus frequently negotiated and adjusted.

Finally, there is a reconciliation process where the costs and benefits are weighed and the features required to launch the product, compared to those that are "nice to have," are selected. The features that are "below the line" are put in abeyance for consideration in a future release. In small companies, this reconciliation process may occur in a simple meeting between the CEO, VP of engineering, and PM. In larger companies, a more formal product council with representatives from each of the relevant functional groups may be set up. At the product council meetings, product releases are regularly debated, negotiated, and slotted on a periodic basis. The process is akin to regular bus

departures, where the product council decides which features are allowed to get on a particular bus until the bus is full. The PM is typically responsible for driving this process to completion, at times by making hard prioritization trade-offs, pushing unpopular decisions forward and being accountable for the results.

Building, Launching, and Improving Products

Building Once the requirements and priorities for the product are set, the product manager works with engineering to make the product a reality. The PM interacts regularly with the engineering team during this phase. She answers questions that engineers may have about product requirements and tracks engineering's progress against plan (unless the product team includes a project manager, as described below). The PM also serves as the "voice of the customer" to ensure that the product being built is one that will meet users' needs. This requires the PM to solicit ongoing customer feedback, which typically entails additional customer interviews, focus groups, and usability testing. PMs may also be responsible for setting up a "beta program," where early and incomplete versions of the product (such as an MVP or a beta version of a more complete product) are released to a selected group of lead users that provides feedback to the company during the building process. A/B tests are typically conducted along the way, where different versions of the product or product pages are put in front of users to test their reaction to one or the other.

The PM must constantly analyze the feedback from the beta program and various tests and collaborate with the engineering team to make adjustments to features and priorities along the way. In making adjustments, the PM must evaluate trade-offs implicit in decisions that would alter the product specification: Does the appeal to customers of proposed new features warrant potential launch delays or added costs? Conversely, would cost and time savings justify a reduction in product functionality? These adjustments need to be assessed and carefully considered, as every additional feature request may have a ripple effect on the schedule (sometimes knows as "feature creep" or "scope creep") and, conversely, every cut from an MVP to make the schedule may yield a false negative about the viability of the product. The PM's role is often to push the engineering team to make changes it views as critical or, conversely, strongly resist scope creep and resist making changes that may delay the product's release.

Launching Once finished, some products are launched with a significant marketing push. In such cases, PMs will drive the product launch strategy and activities, including conducting analyst briefings, sales and partner training, speaking to the press, and working with product marketing (if this is a separate function) to develop all the promotional materials (e.g., website copy, advertisements, sales brochures). Other new products, especially in companies that rely on lean startup methods to iterate product designs, are initially launched with little or no fanfare. Instead, the product launch is similar to the beta program described above—designed as a vehicle for feedback on the key features and business hypotheses.

In either case, it is important for the PM to monitor and manage early adopters' experiences during the product launch. Before launch, this requires anticipating any reliability or performance issues that might arise and developing a plan for resolving them. "Readiness" meetings allow each function to report on progress against a checklist of launch requirements. For example, have sales representatives been trained? Do channel partners have collateral material describing the new product? Are the new application programming interfaces (APIs) properly documented? Have escalation procedures been established to route complex customer service problems to the right parties?

Improving After a product has been launched, the product manager often will turn her attention to the next feature or new product on the road map. However, the PM will continue to be responsible for tracking the performance of prior products and features, relative to expectations. Variance from plan can point to problems that need to be fixed (e.g., a feature with lower than expected use due to design flaws) as well as opportunities to be pursued (e.g., greater than expected adoption by a peripheral customer segment). Some companies have a formal look-back process to determine whether a product achieved its targeted objectives, solve the core customer problem as intended and provide a strong return on the company's product development investment. Others hold formal postmortems, where the cross-functional product team will debrief and discuss ways to improve the product development process.

To monitor performance, PMs rely on internal sales and usage data, including records from customer service interactions. For online products in particular, there typically is a wealth of such data, and PMs must be proficient at analyzing log files using tools such as Google Analytics, Adobe Omniture, and KISSmetrics to pull data from disparate systems into a unified view. PMs often will develop dashboards that make key metrics and trends regularly available to team members and senior management to facilitate communicating the status and performance of the product after launch. Strong PMs watch this data carefully -- focusing in particular on customer acquisition paths, retention marketing and customer relationship management -- to inform future adjustments and product improvements.

After the product is released, a key task for the product manager is adjusting priorities and revising the product road map, that is, the forward-looking plan that shows when new features and new product versions will be released, based on the success or failure of the launch. The PM must again negotiate with peers across the organization to seek consensus on a range of difficult issues. For example, should the team shift its effort to building a new feature that is not on the product road map—one that customers are begging for and the sales team is demanding? What should be done about engineering's insistence that time be set aside to "refactor" code (i.e., to rewrite and restructure an existing body of software code to improve its stability or processing speed without otherwise altering its basic functionality)? The PM typically does not have the authority to make the above decisions unilaterally, but it is her responsibility to manage a process through which the concerned parties thoroughly analyze trade-offs and then reach agreement, or else to escalate the decision to senior management.

The Product Team and Organization Structure

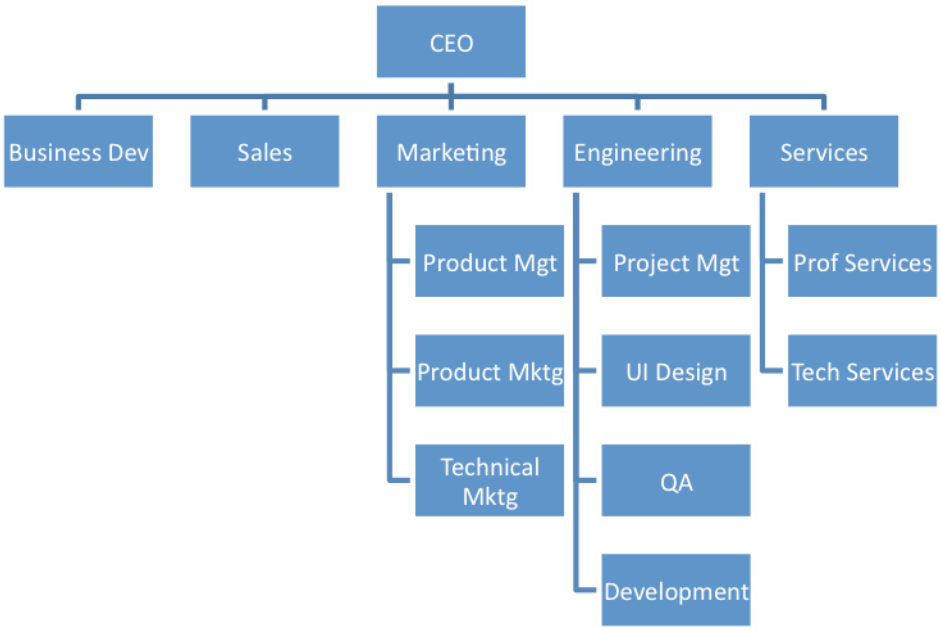
In early-stage startups developing their first product, the founder or CEO often fills the role of product manager. In doing so, the founder wears two hats: (1) product visionary and leader (i.e., product manager) and (2) resource allocator and "chief priority setter" (i.e., CEO). The advantage of this arrangement is that the CEO's product vision can be communicated efficiently. The downside is that there may be less debate over trade-offs when a founder or CEO drives product development in a top-down manner. In an organization with product managers, such debate results from the inevitable tension—described below—between product management and sales (e.g., "You aren't building what customers want!") and between product management and engineering (e.g., "You aren't giving us enough detail to build!" or "Do you *really* need to modify this feature that's already been built?").

As the organization grows, demands on a founder's time increase to the point where he or she cannot simultaneously fill the roles of CEO and product manager. It is time to hire a product

professional and establish a product management practice. Depending on this individual's past experience and the startup's policy about titles, the new product leader might be called a Product Manager, Director of Product Management, or VP of Product Management. The product leader may report directly to the CEO or may report to either the VP of Marketing, Chief Technology Officer (CTO), or VP of Engineering, depending on the product leader's seniority, the makeup of the executive team, and how closely the CEO wishes to be involved with product management. As the company adds new features to its first product and/or launches additional products, product leaders often assume responsibility for multiple products, as well as for developing and overseeing the company's product management processes and for hiring and training junior PMs.

In established technology companies, even if the product leader is not on the executive team, PMs still lead cross-functional teams. In fact, as the organization matures, the need for cross-functional leadership increases: it is more difficult to coordinate and align activities when they are distributed across a larger and more complex organization. The organization chart in **Figure 1** shows a mature company's hierarchy. In this example, PM reports to marketing. No matter where the PM reports, her role is inherently deeply cross-functional, requiring her to interact with colleagues in business development, sales, marketing, engineering, and customer service. The nature of such interactions is described next.

Figure 1 Sample Organization Structure in a Mature Technology Company



Source: Casewriter.

Roles of Product Team Members

Successful technology products are created and launched through the collaboration of a cross-functional team that usually includes, in addition to a PM, representatives from engineering, UX design, project management, and product marketing. Below, we summarize how PMs work with colleagues from these functions. In younger companies, any one individual may play multiple roles. Thus, the PM may also be responsible for UX or product marketing. In larger companies, each of

these roles is more crisply defined and tends to make up entire departments. More detail on the interactions can be found in Marty Cagan's book on product management, *Inspired,* which dedicates a chapter to each function.[7]

Engineering In well-run tech companies, there is a healthy tension and a close partnership between engineering and product management. Product managers design solutions, but engineers—often called developers in software and Internet companies—actually build the product. To do so, engineers specify technologies and tools they will employ, along with an architecture for the solution. In the process, engineers typically consult with the PM, who may push for closer consideration of technical alternatives. A PM must also negotiate with the VP of engineering to ensure that her product gets its fair share of skilled engineers. Conversely, when engineering has budgeted too much time or manpower for a task, bloating the product's budget, a PM must be able to challenge the resource allocation decisions on substantive grounds, but in a diplomatic manner.

Once a product is in development, effective PMs know how to hold engineering accountable for its commitments without causing unnecessary friction. They also know when to push for workarounds and shortcuts that can keep the engineering team on schedule without unduly compromising product quality or architectural integrity. PMs have an informed response when engineers cite the "Mythical Man Month" constraint, which holds that there is a natural limit to how much development time can be compressed by applying additional engineering resources; these engineers will argue that nine women can't make a baby in one month! Likewise, PMs understand the concept of "technical debt"—the consequences of hasty architectural design and coding—and how to respond when the engineering team insists it needs time to clean up past work. Finally, strong PMs know when and how to protect engineering from urgent, ad hoc requests from sales (e.g., "Build this custom feature or we will lose the customer and miss our sales quota for the quarter!").

UX Design The design organization typically reports to the VP of Engineering, but occasionally it reports to the VP of products. User interface (UI) design typically encompasses both interaction and visual design roles. Interaction designers—also called user experience (UX) designers—develop a framework reflecting the natural flow of tasks ("user stories" or "use cases") to be completed by representative customer types ("personas"), based on a deep understanding of customers' behaviors and preferences.[8] These designs, which in the case of software and Internet products often take the form of wireframes (i.e., skeletal depictions of key navigational and content elements, input or output fields, etc.), are passed to visual designers who create the product's look and feel, including colors, fonts, and so on, often based on a "style guide". Designers work closely with PMs to test and iterate designs through rapid prototyping, usability tests, and A/B tests with alpha and beta users.

Interaction designers have varying levels of clout within technology companies. In many technology companies, designers are integrally involved in the early phases of product development and have tremendous authority in setting product priorities. In these situations, the PM role can be more of a process implementer than business decision-maker. In other situations, firms outsource design work or interaction design is left to product managers and/or engineers who may have varied levels of skill in this important area. Ultimately, the buck stops with the PM, who must manage negotiations between design and engineering to ensure that design choices reflect appropriate trade-offs between time-to-market, ease-of-use, and implementation cost.

Project Management Project managers develop a product development schedule, usually in the form of a project flow, Gantt chart, or simple spreadsheet listing the detailed tasks and timelines. They then track progress against the schedule and ride herd on functions at risk of missing deadlines.

Project managers may also be responsible for developing and monitoring product development budgets. In creating schedules, project managers ensure that interim product releases and product development stages are sequenced sensibly, pushing back on engineering or the PM to be more or less aggressive, depending on the circumstances. They also confirm that functions have assigned the necessary manpower at the right time to complete tasks. Smaller organizations tend not to employ project managers; this responsibility shifts to the product manager or engineering manager. But larger projects will often have dedicated project managers, who either report to engineering or the PM.

In most organizations, the project manager reports on engineers' progress against plan, but does not supervise the engineers and is not held accountable for their performance. Who has ultimate responsibility for the product schedule—or put another way, who gets fired if the ship date is missed—is a critical question that must be determined by senior management and involves a great deal of give-and-take between the PM, the product's lead engineering manager, and the project manager.

Product Marketing Product marketing is responsible for managing external parties involved in the product launch (e.g., trade press, PR agencies), training the sales force and providing it with necessary tools (e.g., presentations, white papers, data sheets, competitive matrix, and other collateral), organizing the firm's trade-show presence, and conducting or analyzing market research. The best product marketers stay close to the customer in order to better understand their needs. This gives them insight and influence over things like what products to build and pricing. Some of these responsibilities overlap with those of product management. The distinction between the two roles varies widely by company, and in some instances the roles are combined.

Relationships with Other Functions

In addition to product team members from the organizational units listed above, product managers frequently will interact with colleagues from sales, business development, and customer service.

Sales As with engineering, there is often a healthy tension between sales and product management. Sales reps often push a PM to add product features that will help them close orders. In concert with sales, the PM must then decide which of these features are of idiosyncratic interest to a single customer, and which features would be valued by many customers – and indication of market demand -- and thus would be good additions to the product road map. Effective PMs ask (and are often pulled in) to join sales reps in calling on major accounts in order to leverage the PM's product expertise and increase market knowledge. Working with customers in the field helps the PM learn more about product requirements, but spending too much time catering to requests from sales can divert a PM from other crucial tasks. Often, the PM's role in working with sales involves protecting engineering from the "urgent customer request of the day" interruptions and protecting the company from one-off, custom engineering as compared to scalable product work that is consistent with the product road map.

Business Development The role of business development is to create and manage partnerships that advance the company's strategic agenda (for more detail, see a companion note, "The Business Development Manager," HBS No. 812-107). For example, through partnerships, a firm may secure access to key technologies and production capacity, get assistance with customer acquisition and distribution into new channels, or guarantee the availability of valuable product complements (i.e., helping lead the "buy" vs. "partner" vs. "build decision"). Many partnerships require a firm to adapt its product design to meet new requirements. Zynga, for example, is almost

entirely dependent on Facebook's Platform for customer acquisition and must adjust its product plans whenever Facebook introduces relevant policies or features (e.g., rules about how Platform partners can contact Facebook users; Facebook Coins as the sole means for making purchases within Platform games). In such instances, product managers often join business development managers in discussions with partners to ensure that new product requirements are understood and that they are consistent with the product's strategy and road map. As with sales, there can be a healthy tension between BD and PM where BD pushes the PM group to shift engineering resources toward its high-priority partners, while the PM tries to protect the engineering organization from being exposed to ever-altering priorities based on the special partnership of the day.

Customer Service or Operations The customer service organization supports the product after it is in the hands of customers. This organization may encompass first-line customer support (to respond to customers' e-mails or phone calls about straightforward problems), technical support (to address more complex issues), and installation or professional services (to provide on-site training and custom development to integrate the product into the customer's environment). Portions or all of the customer service organization may be outsourced, particularly first-line support.

Early in the product development process, PMs must consult with customer service to ensure that the product is designed to minimize operational burdens: the best service is *no* service.[9] Later, PMs must work with customer service to ensure that they are ready to support the product when it is released, which entails product training and establishing trouble-shooting procedures and guidelines for engineers to access in the case of emergencies, such as software bugs that affect customers' mission-critical activities. After the product is released, customer service and operations provide valuable feedback to the PM on what customers are saying about the product, which inform the priorities for the next release or suggest adjustments to help documentation or FAQs.

Depending on product requirements, a PM may interact with other functions, including the legal department (e.g., when data privacy issues are salient) or regulatory affairs. For hardware products, PMs must coordinate closely with manufacturing managers, including staff responsible for product cost estimation and procurement.

The Importance of Context

Product organizations differ greatly from company to company and so, too, does the PM role. Usually, these differences boil down to a few key factors:

1. Startups versus More Mature Companies
2. Enterprise (B2B) versus Consumer Focus (B2C)
3. Level of Decision-Making Centralization
4. Scale of Deployments
5. Development Philosophy
6. Business versus Engineering Emphasis

Startups versus More Mature Companies In early-stage startups, one of the founders is often strongly product focused and remains deeply involved in most product decisions even after product managers are brought onboard. In some such companies, decision-making is centralized in

that founder's hands; in others, the founder will embrace consensus decision-making and will involve all team members in important decisions. These decision-making styles pose different challenges for a PM: centralized management can lead to abrupt and surprising shifts in priorities, and consensus-based management can lead to delays and decisions that are muddied by a desire to compromise.

These early-stage startup challenges must be addressed as the product team is learning from customers at a rapid rate, testing hypotheses and iterating its feature set. A product manager must be resourceful at this stage, because she likely won't have help from a project manager or design professionals. Likewise, few product development processes will be in place in an early-stage startup, so the PM must shape them.

As a startup scales, its product teams will struggle with several classic trade-offs. How to balance speed-to-market versus more rigorous testing and product quality? How to sustain innovation as product road maps get longer and the installed base gets bigger? How much emphasis should be put on optimizing existing products versus creating new ones? How much time should be invested in preventive maintenance of the code base? These and many other decisions confront product managers in mid-stage companies. Dealing with such decisions can be challenging: in a rapidly growing mid-stage firm, the PM still must cope with the resource constraints of a startup on the one hand, but also with the political friction and bureaucratic coordination demands that are the inevitable consequence of greater organizational scale on the other hand.

In more mature companies, product development processes are typically well established and understood. A PM's ability to influence these processes is limited, and getting products launched takes more time and effort. However, the PM will also have access to more resources to get customer feedback, optimize designs, and market the product. Mature companies also have a large installed base of customers, which makes it easier to test and sell new products. For these reasons, mature companies can be great training grounds for new product managers.

Enterprise versus Consumer Focus In addition to product complexity, customer type has a significant impact on key factors for success in the product manager role. Enterprise customers often have diverse requirements -- which they are usually quite clear in articulating through Requests for Proposals (RFPs) -- and push vendors for custom solutions that meet their particular needs. In this context, an important task for PMs is determining which features requested by early adopters can be sold to additional customers, and which are idiosyncratic or customized to a single account. Challenges for PMs are very different for consumer products, with unit volumes in the hundreds of thousands or millions and no room for customization or reacting to individual feature requests. For consumer products, PMs must ensure that they are designing the product with mass appeal, maintaining simplicity and clarity, and, in many cases, incorporating elements in the product that allow it to more easily spread virally. Consumer PMs need to be deeply familiar with the relevant distribution platforms in which they're operating, such as Open Graph, Android, Twitter, and e-mail. With high-volume products, PMs also must work with engineering, site operations, and customer service to ensure that an infrastructure is in place to handle volume surges.[10]

Level of Centralization When a founder is very product oriented, decision-making is typically centralized in the hands of one or a few senior executives, even after the company has grown and matured. Apple was an extreme example of this under Steve Jobs, who personally decided products' color palettes. Other technology companies give product managers a higher degree of autonomy in choosing product features, with senior executives weighing in only on major decisions. From a PM's perspective, a centralized structure means that getting buy-in from senior

executives is crucial. In such settings, once the central decision-maker has set the product road map, there typically is a high degree of organizational alignment around product priorities, and resources required to implement priorities are easy to secure.

Scale of Deployments Some products are intrinsically more complex than others. A consumer Internet startup may be able to launch many small products (MVPs) and iteratively test them, consistent with the lean startup methodology, espousing a "launch early and often" philosophy. But other technology companies, such as Microsoft, launch more complex products, often targeting enterprise customers, whose employee training requirements reduce their tolerance for rapid product change and experimentation. Large, complex products tend to be built in large, complex organizations, and a PM will accordingly spend more time on planning and coordination activities. Likewise, with a complex product, a product manager is more likely to be responsible for one of several product components and thus will spend more time working and coordinating with other peers in product management.

Development Philosophy Technology companies may take very different approaches to building otherwise similar products. Some organizations rely on "stage-gate" development processes, so named because effort on a downstream stage only commences when the preceding stage is completed and successfully passes through the "gate" of a formal review.[11] This approach is also called "waterfall" development because a graphical depiction of how stages are completed over time cascades from top left to bottom right. Stages typically include: (1) *concept exploration*, culminating in a business plan; (2) *product specification*, captured in a product requirements document that provides guidance on proposed product functionality, which (3) allows engineers to begin *design work*, which in turn is followed by (4) *product development*, (5) *internal testing*, and (6) an *alpha launch* with pilot customers. Work on most stages is completed largely within a single functional unit, for example, design for stage three or quality assurance for stage five.

Increasingly, technology companies rely on agile development processes—or variations; for example, "scrum" or "extreme" programming—through which product requirements and solutions evolve in an iterative and incremental manner through collaboration by cross-functional teams (see the **Appendix** for more background on agile development). Agile iterations tend to be short—often two to four weeks—and each entails a full cycle of product specification, design, development, and testing. Keeping development cycles short makes it easier to debug products and reduces the amount of rework required when product requirements are revised—a frequent occurrence in fast-moving technology markets.

Under agile development, the PM assumes the role of "product owner" who is co-located with the rest of the cross-functional team and is available at all times to answer developers' questions about intended product functionality. With waterfall planning, by contrast, PMs spend more time specifying product requirements in formal documents, and while they interact frequently with developers, they are less likely to be co-located with them.

Business versus Engineering Emphasis In some technology companies, engineering functions are culturally dominant; in others, business functions—in particular, sales, marketing, and business development—have more clout in resource allocation and priority setting. Usually, the CEO's background indicates where power lies. Business-oriented executives, like eBay's former CEO Meg Whitman, will typically build a product team that focuses on achieving business objectives—one that will prioritize products with more immediate and measurable financial impact and with more predictable development processes. Engineering-oriented executives are more likely to build product teams that pursue elegant and ambitious technological solutions and that grant engineers more

autonomy. While this approach can motivate engineers and stimulate their creativity, it also can lead to over-engineering—creating products with more functionality than the market requires.

Attributes of Strong Product Managers

The product manager role is a general management position, so PMs tend to be generalists rather than functional specialists. PMs come from a variety of backgrounds, although many have held both technical and business-oriented jobs in the past. Although the professional backgrounds of successful product managers will vary, most exhibit the following attributes:

The ability to influence and lead Product managers must be able to exert influence across the organization while holding little formal authority. Consider the challenges confronting a PM in three sequential meetings. In the first, she must command the engineering team's respect to push its thinking on technical design. In the next, she must negotiate with the head of sales to determine which features will be prioritized and which prospective customers should be avoided due to their special requirements. Finally, she must persuade the company's senior leadership to approve product strategy and allocate sufficient resources. Navigating this landscape takes great listening skills, diplomacy, and an ability to marshal arguments in a succinct and compelling manner. Typically, the role requires the ability to inspire extra effort from those around her to push through difficult roadblocks.

Resilience and tolerance for ambiguity Like entrepreneurs, product managers often must make difficult decisions and pursue ambitious goals with limited resources and imperfect information. Even the best PMs often make flawed decisions. Thus, PMs must willing to face the prospect of highly visible failure and to do so under conditions of uncertainty, even though they lack a founder's clear authority.

Business judgment and market knowledge To exercise good business judgment, for example in prioritizing which of the many requirements to fulfill, PMs must have a keen sense of the market and intimate knowledge of customers' needs and pain points. They need to be on top of the latest trends in their industry, attending conferences and reading relevant blogs. The best product managers have the voice of the customer in their heads because they frequently speak to customers and therefore understand and empathize with their pain. Channeling the voice of the customer gives the product manager the credibility to advocate for priorities that may run counter to other managers' preferences. Likewise, a PM's passion for her product will be readily apparent to inside and outside parties with whom she interacts. Like a great entrepreneur, an effective PM can spin a "reality distortion field" that helps persuade other people to commit to her vision.

Strong process skills and detail orientation A good product manager can shift her perspective smoothly, moving between the big picture and the minutiae. She can maintain focus on product vision, strategy, and ROI, but when appropriate, shift her attention to crucial details that could have significant impact on product performance (e.g., combing through bug reports; picking the color for a "Buy Now!" button). Whether working on strategy or tactics, a strong PM insists on getting the right data and analyzing it in a rigorous manner.

Fluency with technology and its implications on product design and business Although successful product managers have diverse educational backgrounds, all are comfortable with technology. A product manager who does not have a background in computer science or engineering must still understand the pros and cons of technology decisions and collaborate with engineers to solve technical challenges. For example, choosing an operating system for the initial product version requires an ability to balance business and technical trade-offs.

Design/UX instincts Often, PMs do not rely on outside designers to shape the product's look and feel but instead leverage their own abilities. The best PMs are skilled at rapidly developing mock-ups and wireframes themselves with a strong design sensibility that cuts through unnecessary steps.

In summary, the product manager role is challenging, but PMs can have enormous impact. Product manager is a great entry-level position for MBAs who seek careers in technology companies, in particular, for those who have passion for creating products, enjoy working with technology and technologists, and take pride in driving internal operating units to satisfy customer needs. Product managers at both large and small companies build skills that are useful for those who aspire to someday start their own businesses. In truth, great product managers are like mini-CEOs, marshaling the company's resources to deliver on the strategy and vision in the form of a product for the target customer.

Appendix: Agile Development: Key Principles and Practices

The term "agile" was coined in 2001 by practitioners of an emerging software development philosophy that emphasized the ability to quickly adapt to changing requirements through rapid iteration with short but complete development cycles.[12] "Completion" encompasses design, build, and test tasks for a given product component. The philosophy's tenets were codified in the Agile Manifesto, which expressed a commitment to:

Individuals and interactions over processes and tools

Working software over comprehensive documentation

Customer collaboration over contract negotiation

Responding to change over following a plan

The manifesto states that "while there is value to the items on the right, we value items on the left more."[13]

The short cycles of agile development mean that product teams secure feedback and can adjust designs quickly, a big advantage in fast-moving technology markets. Likewise, short cycles mean that less work is completed during each cycle, making it easier to find bugs and fix them.

Agile development cycles are of a fixed duration (i.e., they are "time boxed," in the language of project management), often a few weeks. In some agile variations, such as "scrum," all product requirements are frozen during a cycle (also called a "sprint" by teams following scrum methodologies). At a cycle's start, the team agrees upon a set of tasks to be completed and their priority. These tasks are often called "stories" because they entail specific actions that a user might take (e.g., "open the privacy statement page after clicking on home page link"). If any tasks are not completed during a cycle, they are pushed back to the task backlog; the team never extends a time-boxed cycle in order to complete a task. At the beginning of each new cycle, the team reassesses which tasks in the backlog should receive priority for the next cycle, and which might be abandoned altogether or deferred. Keeping cycles short means that the team will not overinvest in features that are subsequently deemed to be obsolete based on feedback received during a cycle.

Agile teams are cross-functional but tend to be small, typically having fewer than 10 members. Team members work in close physical proximity, usually in the same room. This facilitates face-to-face communication and rapid decision-making. A "client" or "product owner"—usually the product manager—often is co-located with the team and is available on the spot to answer questions about requirements and to make trade-offs. Most agile teams start each day with a quick meeting in which members each quickly summarize yesterday's progress, today's priorities, and any expected obstacles. This "daily scrum" is also called a "daily standup," because people are forced to stand, which helps to limit the morning meeting to a time-boxed 15-minute length.

Agile teams frequently release new features in small batches; at the extreme, they release new code continuously, as soon as it is finished. To cope with the high release volume, agile teams tend to make heavy use of automated testing tools. To coordinate and track activity, they rely on wikis and project management tools such as Pivotal Tracker.

Agile methods are used widely, but critics contend they are not well suited for certain types of software development, specifically: (1) unusually large projects with team members in multiple locations, resulting in complex coordination requirements; and (2) software designed for mission-critical applications where failure is not an option (e.g., software for life support systems).

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[7] For a discussion of how product managers relate to engineering, design, project management, and product marketing, see Cagan, *Inspired,* chapters 2–5.

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[10] The difference in management requirements for custom and mass-volume products is elaborated in Geoffrey Moore, *Dealing with Darwin* (Portfolio Trade, 2008), chapter 3.

[11] The principles of stage-gate planning are explained in Robert Cooper, *Winning at New Products* (New York: Basic Books, 2001).

[12] For a more complete description of agile principles and practices, see Kent Beck, *Extreme Programming Explained* (Addison-Wesley, 2004).

[13] See agilemanifesto.org.