SUMMER 2006 VOL.47 NO.4
SMR210

MITSloan
Management Review

Steven D. Eppinger and Anil R. Chitkara

The New Practice of Global Product Development

REPRINT NUMBER 47408

The New Practice of **Global**

Many manufacturers have established product development activities in different countries around the world. Yet their senior managers often struggle to tie those decentralized organizations into a cohesive, unified operation that can efficiently drive growth and innovation. New empirical frameworks may help unlock practices with which managers can deploy well-coordinated global product development strategies.

Steven D. Eppinger and Anil R. Chitkara

Globalization pressures have begun to have a major impact on the practice of product development across a wide range of industries. A new paradigm has emerged whereby companies are utilizing skilled engineering teams dispersed around the world to develop products in a collaborative manner. Best practice in product development (PD) is now rapidly migrating from local, cross-functional collaboration to a mode of global collaboration. Global product development (GPD) therefore represents a major transformation for business, and it applies to a broad range of industries.

The objective of this article is to present frameworks that can help companies address various strategic and tactical issues when considering adoption of GPD. The concepts have been developed mainly through detailed discussions with managers at more than 100 companies in 15 countries in North America, Europe and Asia. Some data are from a recently completed study on GPD that product development company PTC has conducted with BusinessWeek Research Services, interviewing and surveying more than 1,100 engineering managers worldwide. (See "About the Research," p. 24.)

In our discussions with managers, many have found the ideas, frameworks and perspectives presented in this article to be helpful in addressing the transformation to global product development and its implementation today. There is no blueprint, but senior managers can more effectively plan for global product development and take fuller advantage of its promise by examining the various strategies, staged approaches and key success factors described herein and adapting those insights to their own unique set of circumstances.

Defining Global Product Development

Several best practices in product development evolved through the 1980s and 1990s. By 2000, it had become widely accepted that highly effective product development included co-location of cross-functional teams to facilitate close collaboration among engineering, marketing, manufacturing and supply-chain functions. Co-located PD teams could concurrently execute the range of activities involved, from understanding market and customer needs, through conceptual and detailed design, testing, analysis, prototyping, manufacturing engineering and postsales technical product support/engineering. This concurrent engineering practice resulted in better product designs, faster time to market and lower-cost production. PD activities were generally located in corporate research and development centers, which maintained linkages to manufacturing sites and sales offices around the world.

By contrast, the emerging best practice in PD today utilizes a highly distributed, networked development process facilitated by a fully digital PD system. Global product

__Steven D. Eppinger__ is deputy dean and General Motors Leaders for Manufacturing Professor of Management Science at the MIT Sloan School of Management. He can be reached at eppinger@mit.edu. __Anil R. Chitkara__ is vice president of global product development strategy at PTC. Contact him at achitkara@ptc.com.

Product Development

development combines certain centralized functions with some engineering and related PD functions distributed to other sites or regions of the world. This practice may involve outsourced engineering work along with captive offshore engineering facilities. The benefits of GPD are beginning to become clear. They include greater engineering efficiency (through utilization of lower-cost resources), access to technical expertise that is distributed internationally, design of products for more global markets and more flexible PD resource allocation (through use of outsourced staff). (See "Comparing the New Practice of Global Product Development With the Conventional Approach," p. 25.)

The academic literature on global R&D offers a rich variety of perspectives, using terms such as virtual teams, distributed development, international R&D and other variants. Oliver Gassmann and Maximilian von Zedtwitz[1] present several alternative models for organization of global teams and a list of factors affecting choice of locations for GPD operations, along with a literature review on managing GPD teams. Jose Santos, Yves L. Doz and Peter Williamson[2] argue that a truly global innovation process uses global R&D sites both to gain access to foreign technology expertise and to access foreign market knowledge.

However, much of the academic discussion of GPD has been about what it is and why it should be done. There has been less focus on frameworks that managers can use to decide how to implement their decisions to adopt GPD as a corporate practice. Current views of globally dispersed PD are muddied by anachronistic assumptions about labor rates, vagueness about the value of intellectual property, outdated ideas about a company's core competencies and more. As executives make GPD a more strategic priority, the implications of not getting it right may have a significant impact on their businesses. It is important, therefore, to reframe the GPD discussion in light of today's market dynamics, enabling tools and underlying infrastructure. We extend popular definitions of GPD by characterizing it as a single, coordinated product development operation that includes distributed teams in more than one country utilizing a fully digital and connected, collaborative product development process. This may include third parties that provide engineering or design capacity, or it may be an entirely captive, company-owned operation.

Why Is the GPD Transformation Happening Now?

Over the past five years, many industries have seen a rapid shift to global product development. In a 2003 Deloitte Research study[3] of North American and Western European manufacturers, 48% of the companies surveyed had set up engineering operations outside of their home region. In fact, 22% of the North American manufacturers already had located engineering func-

About the Research

The authors set out to chart the new practice of global product development (GPD) in the manufacturing sector with the goal of presenting frameworks that would help senior managers more effectively address strategic and tactical GPD issues. The frameworks have been developed chiefly through detailed discussions with managers at more than 100 companies in 15 countries in North America, Europe and Asia. Data inputs also come from a study that PTC conducted recently with BusinessWeek Research Services.

The initial qualitative phase of the PTC research, conducted in the first quarter of 2006, involved telephone interviews with 30 executives from large manufacturing companies that currently practice GPD. Twenty of the interviewees were U.S. executives, five were European and five Asian. Each interview lasted 30 to 40 minutes. Findings from the interviews were used to design an online survey featuring more than 40 questions about GPD. In March 2006, 1,157 online surveys were completed by product development–oriented executives and engineering/design professionals from large manufacturing companies. Respondents from the United States comprised 65% of the sample, with 17% from Europe and 18% from Asia.

tions in China, as did 14% of the Western European manufacturers polled. In just the last two months of 2005, Microsoft, Cisco and Intel each announced major investments in product development operations in India totaling $3.8 billion, according to the companies' press releases.

As noted in the literature, global R&D networks have been utilized for many years. Two relatively recent factors, however, are now making feasible a truly integrated, yet distributed PD process. First, product design processes today are fully digital and completely networked. Computer design tools are the norm; high-bandwidth networks are ubiquitous. As author and *New York Times* columnist Thomas Friedman writes, such a digital business process enables its distribution across the globe in today's "flat world."[4] Second, many more businesses now have experience with global collaboration. Throughout the 1980s and 1990s, many U.S., Western European and Japanese manufacturing companies located production operations in regions where labor cost much less than at home. Such organizations now have deep experience with globally distributed operations and suppliers. Many multinationals have also grown by acquisition of regional companies whose operations have since been integrated. Most manufacturers today know how to collaborate across global supply chains, and this experience applies directly to collaboration in GPD.

Companies are building their GPD capabilities today for any of four reasons:

Lower Cost Many companies strive to reduce PD operating costs by redistributing activities to take advantage of labor arbitrage or to access more affordable capabilities. There is a huge pool of engineering talent in low-cost regions such as China, the Czech Republic, India and Vietnam — and in medium-cost nations including South Korea, Hungary, Poland and Taiwan. (We consider "low-cost" to be 10% to 20% of the equivalent engineer's salary in the United States, and "medium-cost" to be 20% to 50% of U.S. wage rates.[5])

Improved Process Many engineering managers can recall the key lesson learned from both the 1980s emphasis on design for manufacturing (DFM) and the 1990s emphasis on time to market (TTM). This lesson was that co-locating development teams — particularly the design engineers with the manufacturing engineers — yielded both the cost benefit of DFM and the agility benefit of TTM. The prospect of moving design engineering to global manufacturing locations can be attractive again today.

Global Growth Locating some PD activities in selected international locations can give companies access to critical information about markets in those regions. By using local engineers, companies make direct connections with potential new markets.

Technology Access Companies are using GPD to develop integrated PD processes that include engineers in regions where critical new technology has been developed and where technical experts reside.

Although cost remains the primary reason that many companies initially consider GPD, it is technology, process innovation or revenue growth that drives a GPD strategy. This move from cost to growth and innovation has been a major shift in stated GPD objectives over the past two to three years.

Who Is Leading the Way to GPD?

GPD has been adopted across many industries and in many regions around the world. Some industries and regions, however, seem to be embracing it more quickly than others. A recent PTC/BusinessWeek Research Services survey of 1,157 engineering managers at manufacturing organizations across the United States, Europe and Asia found that 70% of the companies were either planning or executing GPD.[6]

Some Industries Are Rapidly Adopting GPD It is not surprising that software developers adopted GPD quickly. By the early 1990s, as the Internet began to enable global connectivity, leading companies were taking advantage of development operations in several countries. More recently, companies such as Microsoft, Accen-

Comparing the New Practice of Global Product Development With the Conventional Approach

Conventional product development includes co-location of cross-functional teams. By contrast, best practice in PD today features a highly distributed, networked development process facilitated by a fully digital PD system.

Conventional Product Development	Global Product Development
Largely co-located teams	Globally distributed teams
Uses engineering located in existing engineering centers	Takes advantage of engineering in multiple geographic locations, including low-, medium- and high-cost regions
Uses a combination of digital PD tools and conventional paper-based processes for engineering	Uses an entirely digital PD process to facilitate distributed, collaborative engineering

ture, Siemens, Intel, Hewlett-Packard and Toshiba have located software development operations in Bangalore. We have also seen the rapid growth of outsourced software development and support with Indian suppliers such as Infosys, TCS, Wipro, Satyam, HCL Technologies and others. Software development now represents approximately one-third of India's service exports.[7]

Electronics manufacturers led the way to production outsourcing, and most major manufacturers are now taking advantage of the density of electronics design expertise in the Far East. Their GPD efforts are not limited to lower-cost regions. Eastman Kodak recently created its Digital Product Center in Japan to drive product engineering for its digital cameras, under the assumption that access to highly skilled electronics and optics engineers was worth the premium wages.

Traditional manufacturing industries are close behind. Blue-chip names including Alcoa, General Electric, Schneider Electric, General Motors, Toyota and Siemens appear on new development centers in China, India, Thailand, Mexico, Russia and other countries that have an abundance of engineering talent.

Some Regions Are Adopting GPD More Quickly American companies are rapidly embracing GPD. U.S. businesses have a strong culture of global collaboration and thrive on an entrepreneurial spirit that focuses resources on high-value opportunities. Their counterparts elsewhere face more stringent regulations with regard to changing the size and composition of their workforce. German manufacturers are resisting the loss of "quality German engineering" for as long as possible. Japanese business culture includes strong bonds of loyalty between employers and their workers, and thus a reluctance to move engineering work to lower-cost regions. However, substantial pressures for global growth and leaner operations dictate that the practice of GPD is growing in every high-cost country.

China is perhaps the world's fastest-growing manufacturing region, and many multinational corporations are locating offshore R&D facilities in China, often alongside their own production sites. At the same time, China-based businesses aim to become more global. While most still do all their engineering (and production) in China, some are taking advantage of highly experienced engineers in the West to develop new technologies and to help connect with international markets. Haier — one of China's largest manufacturers of electronics and home appliances, with exports of more than $1 billion — now has an R&D center in New York state as well as a manufacturing plant in South Carolina, both paying wages on an order of magnitude greater than in China. These operations have allowed Haier to connect with American consumers and retailers, understand American lifestyles and design products such as refrigerators, washers and wine chillers that Americans are now buying.

India is known as a source of experienced outsourcing partners for engineering work. In recent years, approximately one million IT, software, business process and engineering services jobs have been created in India, ranging from call center and CAD drawing work to patent research and tooling design.[8] Having experienced success with outsourcing such jobs, many Western businesses are now establishing their own offshore R&D facilities in India.

Some of the most impressive companies in medium-cost regions have adopted a hybrid approach to GPD. In South Korea, for example, an effective GPD strategy takes advantage of low-cost engineering (co-located with production in China) for certain functions; uses limited amounts of higher-cost engineering in the United States or Europe for access to the latest technologies and key markets; and still keeps much of the engineering process at home in Korea. Hyundai Motors is an excellent example. The company does most of its engineering work in Korea, but its GPD strategy calls for tapping engineering skills worldwide. The automaker has established operations in the United States for engine calibration and testing (Michigan), vehicle styling (Southern California) and high-temperature testing (California desert).

Companies that have established captive offshore engineering centers report that a scale of approximately 200 people is needed to economically justify the infrastructure and management.

Hyundai also operates research centers in Frankfurt (for diesel engine technology) and in Tokyo.

Other medium-cost regions are attractive due to their proximity to and strong ties with high-cost countries. For example, Eastern Europe is an increasingly appealing location for Western European companies to set up operations — either captive or third party. Alcatel, the French engineering conglomerate, inaugurated its R&D center in Bucharest in mid-2005 to support its advanced rail control systems business in Romania, the Balkans and the Commonwealth of Independent States (the former USSR). Alcatel has had a presence in Romania since 1991, with nearly 1,000 people in production, installation, maintenance and marketing.

The Essential Elements of GPD

Globalizing product development is an evolution that typically takes place over a number of years. Many companies have at least some experience with global operations and distributed engineering processes before they decide to formally develop a GPD strategy. These experiences may derive from the acquisition of a business that has PD resources. They may also be the result of collaboration with manufacturing engineers located near manufacturing facilities or with outsourced design partners used for specific projects.

Outsourcing Versus Offshoring As companies think more holistically about their product development operations and the distribution of various activities, four fundamental modes of GPD emerge. (See "Defining Modes of GPD Based on Ownership and Location of Resources.")

Recent discussion about outsourcing and offshoring — much of it politically charged — is relevant to GPD practice. "Outsourced" typically means the PD resources are owned by a third party, while "insourced" (or "captive") means they belong to the manufacturer. Outsourced resources can be located on-site at the company, down the road at the third party's offices or halfway around the world. The term "offshore" refers to the location of those resources — generally meaning lower-cost regions. Viewing the two concepts together allows us to envision four modes of global product development operation:

Centralized This mode is the traditional one, in which all product development resources are within the company and at onshore locations. Centralized operation can include different project teams in multiple countries, such as a U.S. team and a German team. All resources are owned by the company and located in the "headquarters" countries — that is, generally in high-cost regions.

Local Outsourcing This mode has been commonly used, often in conjunction with the centralized mode. Many large manufacturers use on-site contractors to support their product development activities. Local outsourcing is used for two primary reasons: to gain access to specialized skills or to meet temporary requirements for capacity. For example, in the concept development phase, a number of ideation activities are the distinctive competencies of specialized outsource firms, such as IDEO, Design Continuum and Smart Design.

Captive Offshoring One of two relatively recent offshore GPD modes, captive offshoring is useful when a company believes it should own a PD operation in a region in which it has not done business before. This requires choosing a location, hiring a management team, securing a facility, establishing the operation as a legal entity, understanding the local regulatory and tax requirements, hiring and training staff, and putting in place the supporting finance, human resources and information technology processes. Cummins and Textron have established centers in India; ABB and Delphi have set up centers in China; and Boeing and Airbus have established centers in Russia. These companies are seeking to utilize some of the specialized skills, talent and experience in these respective countries — India for complex, highly engineered products; China for its proximity to manufacturing and the large domestic market; and Russia for its long heritage in aerospace.

Companies that have established captive offshore engineering centers report that a scale of approximately 200 people is needed to economically justify the infrastructure and management investment. However even if financially justified, such an operation takes several years to build up to the point where the center is effectively incorporated into the company's culture and processes.

Global Outsourcing This type of arrangement — the other offshore GPD mode — gives many companies early experience with GPD without requiring the commitment to establish a captive center.

Companies contract with a service provider to undertake basic engineering tasks, such as updating drawings, implementing engineering change orders or writing technical publications. This is typically done by staff augmentation on a time-and-materials basis, with an early focus on transferring knowledge and building a working relationship. By using outsourced staff only at certain points in the process, the company keeps control of the PD process overall. However, this is an important step in moving toward a deeper integration of product development with the outsourced provider because it helps the provider understand the company's PD processes, methods and protocols, and it helps the company understand the technical capability, costs and timeliness of the outsourced provider.

Many companies eventually want outsourced providers to take on larger projects where ownership of the whole process shifts entirely to the outsourced provider. For example, the company may define the specifications for a subsystem. Then the outsourced provider does the high-level design, detailed design, prototyping, testing and redesign, ultimately delivering a completed design along with the necessary models, documentation and test results. There may be design reviews throughout the process, but overall ownership lies with the outsourced provider. Outsourced providers are increasingly focused on developing strategic relationships with their customers by providing dedicated, secure centers; however, the employees and competencies developed within these centers generally remain with the providers.

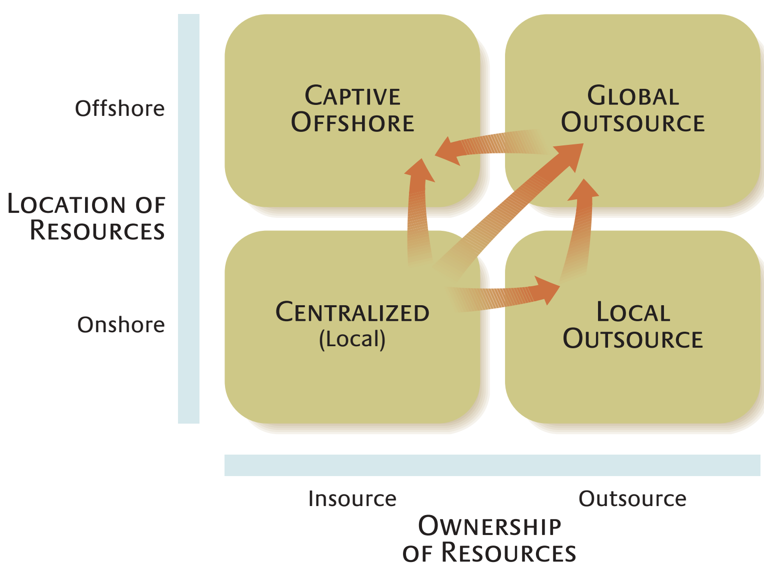
Many organizations begin GPD with various trials of outsourcing and tend to move toward the captive offshore mode as a longer-term strategy. (See "Defining Modes of GPD Based on Ownership and Location of Resources.") There are three reasons why an offshore center may become strategic, thus warranting a captive approach: (1) the work product contains intellectual property related to products or processes that provide valuable differentiation, (2) the skills and expertise that will be developed in the center relate to a core competence for the company or (3) the center will provide a basis for understanding local markets and designing products based on that understanding. For each reason, companies will want to retain control of the center and its human and capital resources, processes and systems.

The Staged Deployment of GPD

We have observed that best-practices leaders typically deploy a GPD strategy in stages, allowing them to gain experience gradually by moving more and more development responsibility to new locations. Companies often start by using an outsourced provider that augments an existing process in simple ways and then takes on more substantial responsibilities. As a new location contributes more value, companies may open their own captive centers to develop capabilities and retain competencies within their own PD operations. Recognizing, of course, that there are many hybrid variants, here are three basic scenarios of staged GPD deployment. (See "Staged Approaches to GPD Deployment," p. 28.)

Defining Modes of GPD Based on Ownership and Location of Resources

Four fundamental modes of GPD emerge as companies think more holistically about their product development operations and the distribution of various PD activities.



Process Outsourcing The first approach involves outsourcing of PD process steps, which allows companies to work with outsourced service partners that may be distributed globally. Stage 1A starts by outsourcing simple tasks to an engineering services provider. These tasks are easy to document and separable from other activities, and they pose relatively low risk to the critical PD activities. Such tasks may include creation of detailed drawings from a CAD model or translation of technical publications into different languages. In Stage 2A, as the organization gains more experi-

Staged Approaches to GPD Deployment

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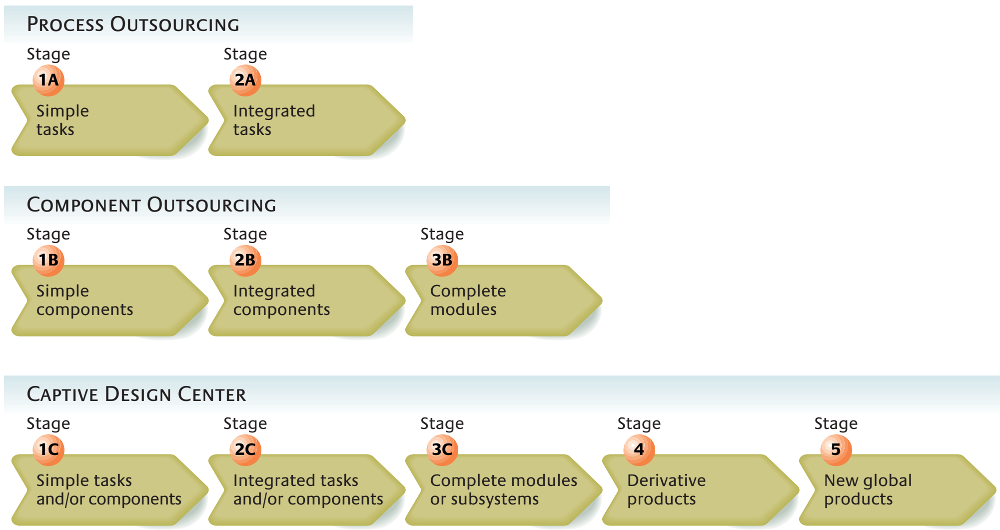

ence with distributed PD, its managers outsource more complex and integrated tasks, such as CAE analysis or tooling design.

Component Outsourcing The second approach — also in the outsourcing category — is to decompose the product into components and modules. This path is generally followed when a company is outsourcing development work to component suppliers. In Stage 1B, development of some simple components is assigned to chosen suppliers (which likely would also produce those components). In Stage 2B, the design of integrated components is outsourced. In Stage 3B, suppliers develop complete product modules, such as the exhaust system for an internal combustion engine or the circuit board for a mobile phone.

Captive Design Center The third approach sees development of a captive global design center — a strategic decision to invest in global engineering capability. Many organizations take this route after learning to utilize globally distributed resources for large parts of their PD processes. Because the transition from outsourcing to a new captive center is difficult, the center is likely to begin working at Stage 1C or 2C, in parallel with outsourcing, to develop these important capabilities first. In Stage 3C, the center executes complete subsystems, such as the design of a control system for an electromechanical product. In Stage 4, the center may take on complete design responsibility for derivative products and/or ongoing engineering support for existing products. Typically, companies try to move to Stage 4 as quickly as possible to generate the strategic benefits. Finally, in Stage 5, the center is fully able to develop new global products, product platforms and next-generation innovations.

A mature GPD structure combines all three approaches and uses a balance of captive and outsourced resources, distributed globally. At this point the company may have one or more captive offshore R&D centers and will augment these facilities with selected outsourced engineering services. The service providers may work within the captive centers as part of a team or in their own facilities. Some companies will develop global technical centers of excellence that nurture specific core competencies, develop new technologies and create product innovations. The mature GPD structure may evolve over time as new competencies and geographic regions become important, and older products and technologies may move to a maintenance mode, better supported by third parties.

Research on the dynamics of process improvement shows that PD productivity almost always falls off when dramatic change is imposed. Repenning explains such "worse-before-better" system dynamics in the context of PD process improvement efforts.[9] Offering strong evidence in the GPD context is a 2004 Columbia University Center on Globalization and Sustainable Development study[10] of companies with experience in global outsourcing. The study found that companies new to outsourcing (less than a year) are unsatisfied with the experience, while those with more experience are satisfied with their outsourcing arrangements. The GPD learning curve appears to require at least a year of experience with each successive stage of process change before the global process runs smoothly.

Key Success Factors for GPD Deployment

Several key strategic decisions should be made before deploying GPD. These include defining a product strategy that delineates new technologies and target markets, identifying core competencies and intellectual property strategies and choosing locations for design centers and the GPD mode for each (for example, captive offshore, global outsourced). The transition to a GPD operation brings its fair share of risks that must be managed. GPD

Research on process improvement shows that the GPD learning curve requires at least a year of experience with each successive stage of process change before the global process runs smoothly.

may impair PD productivity, put intellectual property and core competencies at risk or cause organizational disruptions as roles and processes change. Below are 10 key success factors that can help companies overcome some of the challenges presented when deploying GPD.

1. Management Priority GPD may require significant changes to the organization, processes and culture. Therefore, the executive team must have strong, visible commitment to the success of GPD. This commitment includes investment of the resources necessary to endure the worse-before-better performance of the PD organization. Some companies appoint a corporate GPD executive to drive the GPD strategy across the various businesses, set up global design centers (captive or outsourced), facilitate the distribution of work to the global centers, and ensure that tools, training, infrastructure and processes are in place.

2. Process Modularity To enable PD activities to be carried out in different locations, there must be a methodology to segregate the work packages for global distribution. For example, where a remote center will be handling tasks in a process that continues to be owned by the "central" PD location, a modular process is needed. The process must be broken down into clear steps, the steps distributed to different locations and the process reconfigured to allow for the necessary handoffs, reviews and approvals.

3. Product Modularity Modular product architecture is very helpful for GPD in which development of complete subsystems or components is to be carried out by teams in different locations. Clearly defined interfaces between modules facilitate their separate development and eventual integration into the product. Without such modularity, more intense collaboration across design interfaces is necessary.

4. Core Competence Development of core competencies is critical to a company's sustainable advantage, so it is vital to control these competencies. "Don't outsource the core business" is a fundamental principle of GPD. Accompanying any outsourcing decision is the danger that the company will lose these elements of PD expertise as the provider gains the knowledge. The company may become captive to the supplier for the work, and the supplier may grow to become a competitor. Conversely, a company can gain access to needed competencies by tapping the expertise of outsourced providers.

5. Intellectual Property As critical product data, designs and technologies are shared more widely outside the company, protection of IP becomes more difficult. Defining products and processes in a modular structure not only can help with the distribution of activities, but also can help protect IP.

6. Data Quality The availability, accessibility and auditability of data become key challenges when many locations contribute to the PD process, often using different tools and databases. Teams may be working on different aspects of the product with similar "source data." As these data change during the process, all users of the data must be aware of the changes and the implications for their work. One system or database must be used as the "source of truth."

7. Infrastructure Globally distributed PD teams often have tools, technologies, systems and processes that are specific to individual locations. GPD requires a more unified approach to infrastructure and systems to ensure that the appropriate information can be readily accessible regardless of location or bandwidth constraints. As design centers open in locations such as China, India and Eastern Europe, the network and power reliability may not be sufficient to support a fully operational center. Intermittent power and network outages may severely impact the center's productivity.

8. Governance and Project Management Managing a globally distributed PD operation is a complex activity, and it becomes more complex with every outsourced arrangement in a new time zone. So it is critical to have a strong capability to coordinate and monitor the entire program in terms of milestones, technical work quality and cost. Detailed project planning determines which decisions are made at what levels and locations, and how to coordinate across the operation to ensure alignment and proper execution.

9. Collaborative Culture The transition to GPD must incorporate new ways to collaborate among teams and individuals across time zones, languages, cultures and companies. A key enabler is a consistent set of processes and standards. As PD processes span locations, the practices and methods must be consistent and the standards for each work element explicit in order to reduce the variability of PD task outputs. Many companies have had success in creating a collaborative GPD culture by transferring a manager from a central location to a new, remote design center for up to two years to educate the local team on the PD processes and to act as a liaison with the home office. The remote center may also send engineers to the home office for similar reasons. The trust necessary for effective GPD can only be developed over time, but exemplar companies do not skimp on bidirectional travel between centers at multiple levels in the organization. They view travel not just as a startup activity, but as an ongoing necessity to build and sustain relationships.

10. Organization Change Management Many companies that have set up a new GPD operation find that some of the most challenging changes are those involving individuals' roles, behaviors and the new skills required of them. Careful planning, training and education should go toward the individuals who play critical roles in making the new GPD model operational.

The GPD Mandate and Its Risks

GPD is rapidly becoming the next-generation practice of product development. Companies are adopting the approach quickly, spurred by international competition, new market opportunities, digital and networked PD process connectivity and the availability of low-cost skilled engineering workers worldwide. Although GPD is just now starting to win mainstream attention, companies are rapidly adopting new PD strategies, testing various modes and moving to more global operations. This is a major structural change that will continue to develop over the next decade.

The political concerns surrounding globalization of PD are significant. Many engineering jobs and related management and support roles are being lost in the United States, Europe and Japan as these jobs move to lower-cost regions. Contentious questions abound. How will we keep engineers and managers employed in these high-cost countries? What is the future growth outlook? How can these nations fight back? Should they fight back? The globalization of business often runs head-on into national economic agendas.

Alan Blinder, Princeton economics professor and former vice chairman of the Board of Governors of the Federal Reserve argues in a recent article[11] that we have seen only the beginning of the trend of American service-industry jobs migrating to lower-cost regions. When this takes off, he argues, it may amount to a new industrial revolution. The accompanying economic and social adjustments will be substantial, and managers considering launching or expanding GPD initiatives must be aware of them and their impact on GPD decisions.

ACKNOWLEDGMENTS

We would like to thank the many colleagues, MIT research sponsors and PTC customers who have generously shared their GPD experiences and knowledge with us. We could not have developed the observations in this article without their support and partnership. We are also grateful to several colleagues and anonymous reviewers who provided insightful comments and helpful suggestions.

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