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# Taking R&D Global

*Meeting the Challenge of Getting It Right*

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# Taking R&D Global

## *Meeting the Challenge of Getting It Right*

A leading high-tech multinational company (MNC) has seen its main R&D center, located in Bangalore, grow from 300 staff members in 2000 to 3,700 in 2008—and is planning to continue its growth at a mature pace of 10 percent per year. That center, which is now the company's largest outside the United States, has filed more than 680 U.S. patents and played a key role in developing the company's global intellectual property.

In contrast to this clearly successful experience, many MNCs have been disappointed in their efforts to build R&D centers in rapidly developing economies (RDEs). Why are some MNCs succeeding in addressing the challenges and capturing the opportunities of operating R&D centers in RDEs, while others are failing?

In this paper we explore this important question. The perspectives presented here are based on an extensive study of MNCs, representing eight industries, that have R&D centers in RDEs. We first set forth some of the major benefits that such activities can generate. Then we turn to three basic types of R&D centers and the roles they can usefully play within a global organization. Third, we address the key factors we have identified as contributing to creating a globalization-ready R&D organization and propose four “golden imperatives” for success. Finally, we offer some thoughts on making the tough tradeoffs needed to succeed in this arena.

### **Why Do R&D in RDEs?**

Some MNCs question why they should do R&D in RDEs at all. They cite a host of concerns, including anxiety about the difficulty of communicating across cultures; the costs, in time and effort, of working across the distances involved; and the risk of losing their intellectual property. Some of them also cite firsthand experiences with disappointing results, such as running pilot projects in RDEs only to find that, after considering all the “hidden” costs of expatriate staff, supervision, quality issues, and the like, they had achieved no real savings.

In our view, although these concerns merit senior-level attention, all of them can be managed effectively. But before we turn to specific ways to address them, let's look at some arresting facts.

Labor costs for engineering graduates in RDEs can be far less than those for graduates in developed countries. For example, in 2008 in India, an “associate engineer”—a recruit with no specific expertise—earned just \$4,400 per year, as compared with the \$53,400 typical of a newly minted engineer employed in Europe or North America. BCG has observed that MNCs based in developed countries can typically lower their R&D labor costs by 40 to 60 percent in RDEs, compared with their domestic R&D labor costs. So a number of MNCs, hit by the rising cost of R&D in their home countries, on the one hand, and the growing need for more R&D projects, on the other, have established new R&D centers in RDEs. As one of our clients told us, referring to his company's RDE-based R&D center, “We get more bang for the same R&D buck.”

But cost savings are not the only benefit of doing R&D in RDEs. Many MNCs have encountered shrinking talent pools in their home countries. Locating R&D centers in RDEs allows them to gain access to large numbers of trained researchers and engineers. Overall, in 2007, RDEs accounted for two-thirds of the global engineering talent pool—and that share is growing. Moreover, many of the engineers in RDEs are well trained and highly skilled.

MNCs that have been running successful R&D centers in RDEs for many years see the biggest reason for

their presence in these countries not as cost savings or access to talent, though both are of course important, but as the ability to design and develop products specific to these fast-growing markets. In 2000, the largest RDEs—Brazil, Central and Eastern Europe, China, India, Indonesia, Malaysia, Mexico, the Philippines, Russia, Thailand, and Vietnam—generated less than 13 percent of global GDP, while the OECD countries generated 81 percent. By 2008, the largest RDEs' share had grown to 20 percent. In 2010, the IMF estimates, RDEs will drive virtually the entire growth of global GDP. In 2014, when the developed economies will presumably have recovered from the current economic crisis and resumed healthy growth, RDEs' contribution to the growth of much larger worldwide GDP is expected to be about 50 percent.

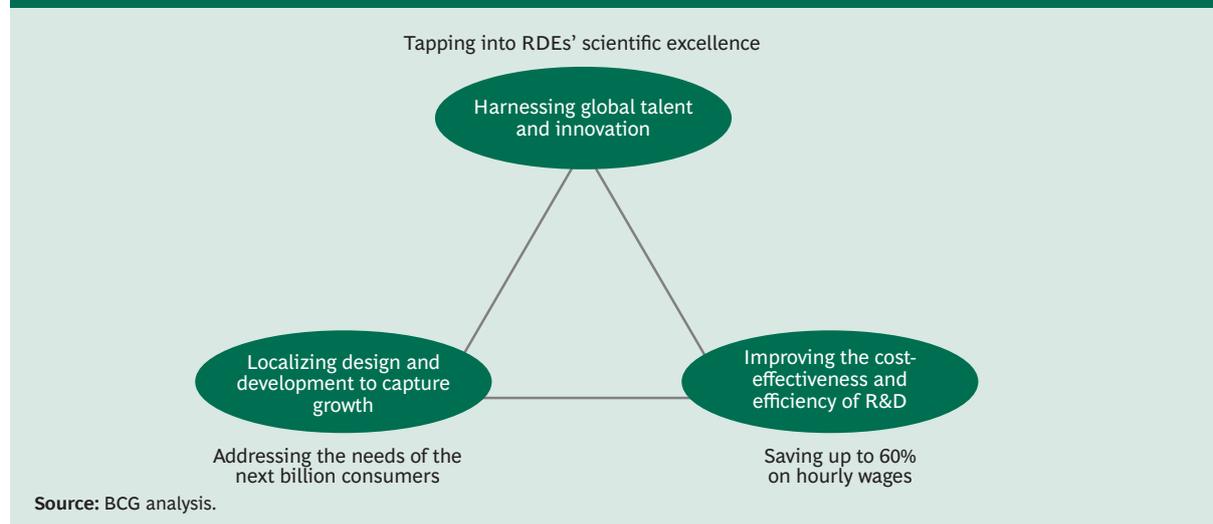
Significantly, these countries are also home to many of the world's "next billion" consumers: the next tier of emerging-market consumers, who are commonly considered impossible or unprofitable to serve with current business models but who could become profitable to serve with new ones. In fact, in 2008 the next billion already numbered some 3.7 billion people, with annual earnings of \$2.3 trillion; if those earnings continue growing as they have in recent years, they will reach \$4 trillion in 2015. Global companies that want to tap into this vast pool of new consumers need to develop products and services that cater specifically to these segments in the RDE markets, rather than merely tweak existing offerings. Establishing R&D centers in these markets is often a critically important first step toward achieving this goal.

### Setting the Right Objectives

A global technology leader, one of the first to recognize the market potential of the next billion, began to globalize its R&D in the late 1990s. This effort, which is still ongoing, will see the number of scientists and engineers at the company's major RDE-based R&D center at Bangalore reach 4,000 in 2010. This center has played a key role in improving the cost-effectiveness of the company's R&D significantly. It has also developed numerous global products and now has global responsibility for four product lines. Furthermore, it has filed more than 100 patent applications and has played an impressive role in designing products for local markets.

This technology leader has reached the most mature stage of globalizing R&D: its R&D centers in RDEs are equal partners in the company's global R&D organization, and the company is benefiting not just from RDEs' cost-effectiveness but also from their talent, which lies in designing winning products for both local and global markets. However, most MNCs are at lower levels of maturity on their journeys toward operating successful R&D centers in RDEs. Many must consciously make tradeoffs among the three key objectives of taking R&D global: improving the overall cost-effectiveness and efficiency of R&D, harnessing global talent and innovation, and localizing design and development to capture growth. (See Exhibit 1.)

### Exhibit 1. Globalizing R&D Offers Three Key Opportunities



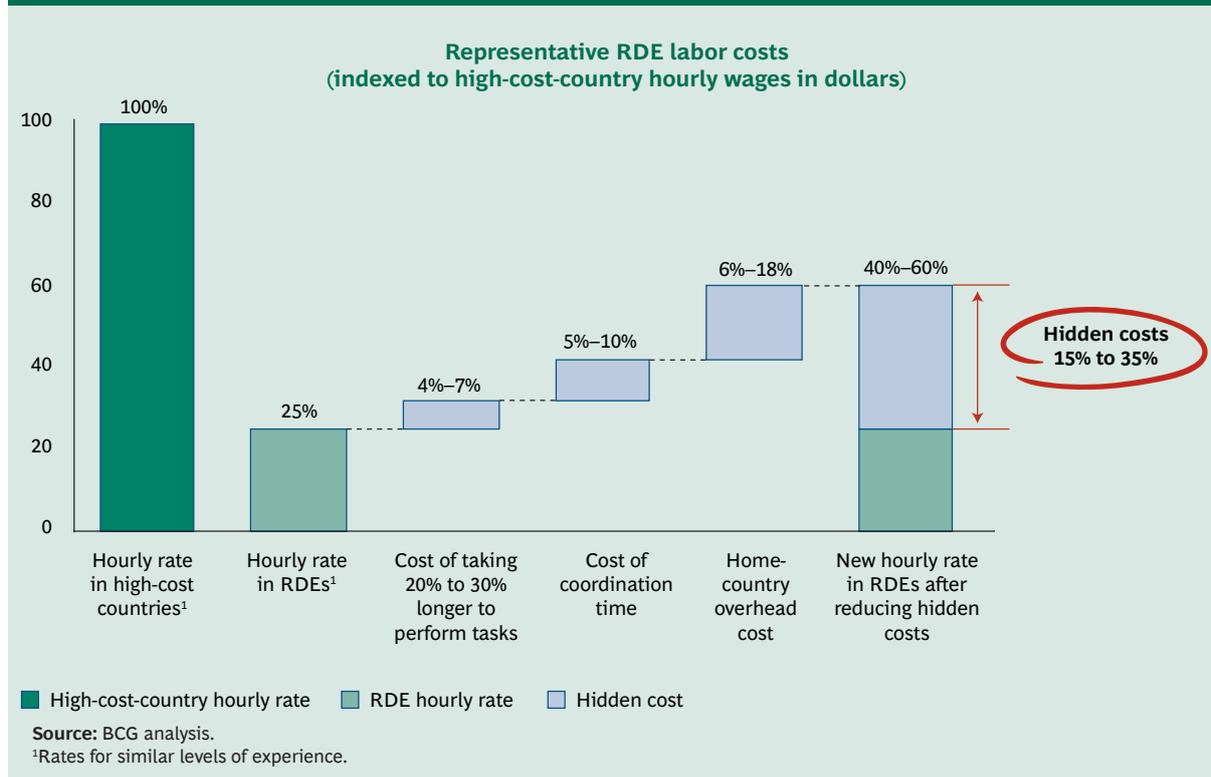
### Improving the Overall Cost-Effectiveness and Efficiency of R&D

The lower labor costs offered by RDEs represent only one side of the cost equation. Companies must also consider “hidden” costs—which can amount to as much as 35 percent of overall R&D costs, eroding any benefit the MNC is expecting. Hidden costs typically reflect, for example, the need to spend more time on tasks than R&D teams in the home country would spend, the time needed for coordination between RDE-based teams and teams in developed countries, and the home-country overhead time for sharing expertise and setting standards. (See Exhibit 2.)

Companies can shrink these hidden costs by gaining experience. For example, let’s compare the experiences of two engineering, procurement, and construction companies in the same power industry. One company ramped up a new RDE-based R&D center with 350 full-time equivalent employees from “scratch to project responsibility” in less than two years, stationing only two expatriates on the ground. The other company spent four years creating a center of the same size—and involved more than 20 expatriates. Because the full costs of expatriates are as much as 15 times higher than the costs of local employees, that extensive expatriate involvement significantly eroded the cost benefits of the second company’s new center.

Another way to shrink costs is by applying best practices. These include using codified standards rather than implicit ones, written codification of working cultures rather than oral codes, and deliverables-driven development principles rather than activity-driven ones. For instance, most engineering divisions employ development processes that specify expected, codified deliverables at each milestone, such as, “All level 2 specifications should be validated.” What the codification neglects to specify is the *how*: how to assess and confirm the validation. This lack of clarity around the *how* generates significant additional coordination, often ending with the company flying home-country-based experts to the new center to validate the output. On average, MNCs’ home-country-based R&D engineers need to spend 20 percent additional time transferring know-how and piloting a project’s progress. Successful companies have been able to reduce that coordination time to less than 5 percent.

**Exhibit 2. The Hidden Costs of Doing R&D in RDEs Can Amount to 15 to 35 Percent of Home-Country Costs**



Companies can also optimize asset utilization across their global networks by consolidating asset- or labor-intensive activities in one or more low-cost locations. For instance, a pharmaceutical company might consolidate its chemical R&D in one place, while an automotive company might consolidate testing, detailed design, and computation. Locating each R&D function where it can be performed most cost-effectively allows companies to reduce their overall investments; and working in multiple time zones allows them to maximize asset utilization around the clock.

### Harnessing Global Talent and Innovation

R&D centers in RDEs can provide access to large pools of trained researchers and engineers at relatively low cost. Where are all these employees coming from? RDEs themselves are developing modern infrastructures for training and attracting researchers and engineers. India and China, for instance, have top-notch training facilities. Nine of their universities are ranked among the world's top 100 universities in engineering and IT, according to Times Higher Education, 2008. For example, Tsinghua University in China ranks twelfth and the Indian Institute of Technology, Bombay ranks thirty-sixth.

Also swelling the pool of highly trained researchers in RDEs are the students and scientists who return to their home countries after studying in developed economies. Our survey indicates that the number of Asian students and scientists following this pattern has been increasing. This is in part because some of their governments are now offering inducements for them to come home. The Chinese government, for example, offers incentives to Chinese scientists and engineers who receive training abroad and then return to work in China. In 2008, the Indian software industry alone employed more than 30,000 returned professionals.

Thanks to the large numbers of R&D practitioners being trained in RDEs, as well as those attracted back home from developed countries, qualified engineers with prior MNC experience are increasingly available there. For instance, we estimate that in 2008, fully one-third of the 80,000 engineers working in foreign-owned R&D centers in Bangalore had at least ten years of experience, qualifying them to serve as lead product architects.

Opening R&D centers in RDEs gives companies direct access not only to talent but also to innovation in the region. One factor contributing to a surge in local innovation is strong support by RDE governments. For example, China and India have both declared innovation to be a national strategic priority. In January 2006, China announced its 15-year "Medium- and Long-Term National Plan for Science and Technology Development." The plan calls for China to become an "innovation-oriented society" by the year 2020 and a global leader in science and technology by midcentury. It calls for steep increases in R&D expenditures over the 15-year period, from 1.23 percent of GDP in 2004 to 2.5 percent of what will certainly be a significantly larger GDP in 2020. And it sets two far-reaching goals: first, for China to become one of the top five countries in the world in the number of new patents granted for inventions; and second, as noted by the American Institute of Physics, "for Chinese-authored scientific papers to become among the world's most cited."<sup>1</sup>

India's goals are no less ambitious. They were nicely captured by the slogans used to promote the 2005 and 2006 national R&D expositions in New Delhi: "Think Innovation, Think India," "Mind to Market," and perhaps most telling of all, "The World's Knowledge Hub of the Future." In support of such goals, the sponsors of the annual meetings reminded attendees that India's R&D investment had been growing at a compounded annual rate of more than 40 percent. Today India has 353 universities, 11,698 general institutions of higher learning, and 7,797 professional institutions. Together they churn out annual totals of some 6,000 PhD's and 500,000 graduates of three- and four-year programs in engineering.

Another indication of the proliferation of research in RDEs is the galloping growth in the number of their scientific publications. In 2007, China, India, and Russia together produced more than 160,000 scientific publications. We expect that within ten years, these countries' publications will likely reach—and possibly surpass—the number written by scientists in the United States.

For MNCs, the question is how to tap into all this opportunity. One entry strategy that has proved

1. "China's 15-Year Science and Technology Plan," *Physics Today*, December 2006.

successful for some MNCs is first to invest in a center located in an established innovation hub and then to add satellite centers in more remote areas of the country in order to leverage the less costly workforce. Often the high-innovation centers also contribute to global R&D by initiating or supporting valuable partnerships with local research institutions. Such arrangements are particularly useful because of the value of geographic proximity and collaboration networks in research. (See Exhibit 3.)

However, MNCs must deal with high attrition rates in RDEs. Participants in our study cited firsthand experience of rates higher than 20 percent. Because talent is a critically important resource in R&D, hiring and retaining good people in RDEs requires systematic and dedicated efforts. To gain access to the best talent, companies must not only use all available recruiting channels, including the Internet, but also establish a frequent presence on the campuses of leading universities. To retain top-notch talent is similarly challenging. Our survey revealed that while steadily rising compensation and other benefits (including stock option plans similar to those in developed countries) are important, it is even more important to provide escalating responsibilities (to avoid the ceiling effect) and international career tracks, including international training and development programs. The companies we studied that had applied those levers had lowered attrition rates to less than 6 percent.

### Localizing Design and Development to Capture Growth

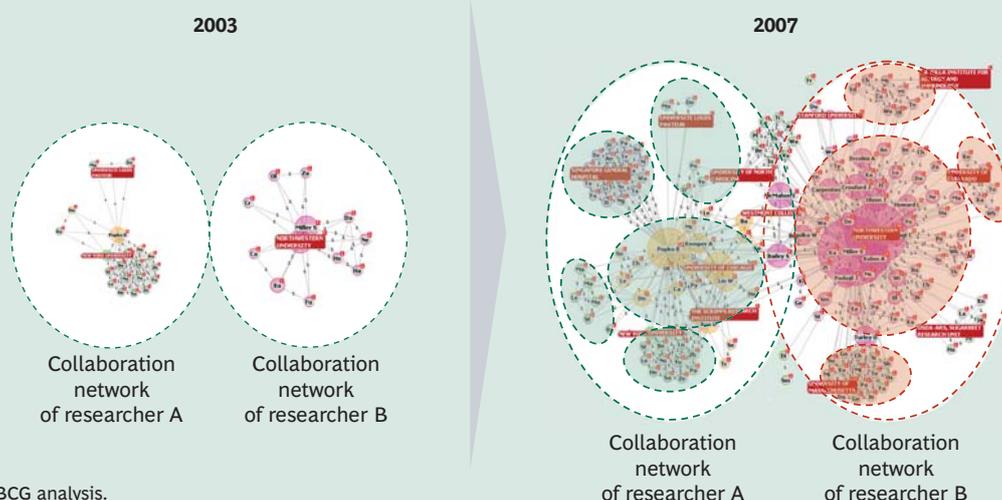
A key advantage of having an R&D center in one of the fast-growing RDE markets is that local designers and engineers are particularly adept at localizing product specifications and making the design tradeoffs needed to compete effectively there. Products designed for the next billion consumers need to be easy to use and maintain, reliable, robust, and affordable. For instance, automotive engines intended for these markets “must be capable of running on poor-quality fuels, including just about everything that can be burned,” explained the head of the Indian R&D center for a leading tier-one supplier.

Similarly, the Indian center of a leading medical-device company designed an RDE-specific product that is 80 percent cheaper and 80 percent lighter than currently available models, can be easily handled by medical representatives, and is adapted for use in dusty environments that are off the electrical grid. This product is outperforming all others in the Indian diagnostics market, and the company is now exporting it to Europe.

Most designers in developed countries have little or no familiarity with consumers and markets in RDEs. In contrast, local engineers are experienced at adapting their design standards and testing to meet local

## Exhibit 3. The Cluster Effect Is Key to Research Effectiveness

**Illustration: Rapidly growing research-collaboration networks have played a key role in achieving progress toward a cure for multiple sclerosis**



consumers' needs. So local engineers generally lead design projects dedicated to the next billion consumers.

Tata Motors, for example, used primarily Indian ingenuity in designing the breakthrough Nano car, which sells for less than \$3,000. However, Tata also involved even its MNC suppliers, such as Bosch, in pushing the boundaries of automotive innovation to this new frontier. To achieve this goal, Tata translated customer needs into optimized specifications, such as electronic control units with only 300 functions (in contrast to those used in Western cars, which have 1,000 functions); drum brakes instead of disc brakes; a single-injection fuel system; and a 35-amp generator, rather than the usual 40-amp model.

To meet the affordability criterion for RDE market acceptance, companies need to make their full cost structures competitive locally by integrating their entire value chains and making as much of the chain local as possible. Companies should also address the tradeoffs between “stripping down” existing products and features and developing offerings from scratch to achieve real breakthroughs such as the Tata Nano. It is also important to access the local lobbying network and influence local standards to the company's advantage. Having an R&D center on the ground in the region is essential to meeting those goals.

### Redesigning the R&D Organization

Setting up RDE-based R&D centers to meet the objectives discussed above calls for adopting a different design for the R&D organization. We have identified three distinct roles for R&D centers within the overall organization: cost cutter / effectiveness master, innovation and talent seeker, and localization leader.

**Cost Cutter / Effectiveness Master.** The most efficient way to achieve cost-effectiveness is by establishing competency centers, which build scale around specific competencies, such as CAD, computational mathematics, or product testing. Companies must ensure that these centers are optimized across the global network.

**Innovation and Talent Seeker.** The mission of these centers is to create talent pools in RDEs to focus on particular technologies. The team in each such center has global responsibility for one or more technologies. Normally these centers are located near research hubs and universities that focus on the technologies in question.

**Localization Leader.** Centers in this category develop localized products and support the localization of the different activities of the value chain. Each such center needs to have a full set of integrated capabilities. While these centers can draw on the experience of R&D centers in developed economies, they tend to be the most independent of the three models.

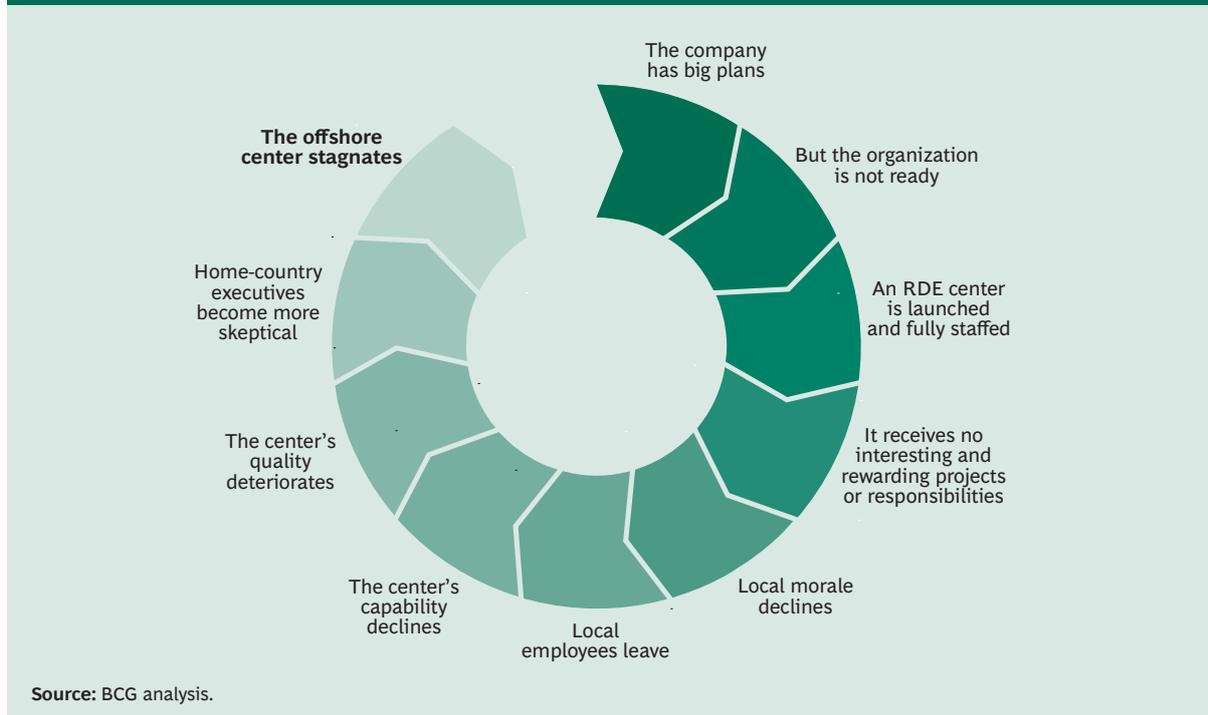
The decision as to which role a given R&D center should play must be made in light of the company's overall strategy. Trying to achieve all three objectives at the same time in a new or still-maturing R&D center can jeopardize the center's effectiveness and growth.

### Taking the R&D Network Global

Most companies that have created R&D centers in RDEs are still struggling to make them work efficiently and effectively as part of their global R&D networks. Usually, the problem of integrating an RDE-based center into an existing network lies not with the RDE-based center but with the company's established R&D centers—and other parts of the organization—in developed economies, particularly in the company's home country. These MNCs have fallen into the trap of “unreadiness” for globalizing their R&D: there is a significant gap between the company's ambitions and its capabilities. This condition can trigger a vicious cycle in which the company launches an RDE-based R&D center but fails to empower its people or give it interesting and rewarding projects, so the most highly skilled staff members leave, quality and effectiveness decline, and the center stagnates. (See Exhibit 4.)

Fortunately, there are measures that companies can take to address unreadiness. The first step is to recognize the problem.

### Exhibit 4. Taking R&D Global Before the Organization Is Ready Can Trigger a Vicious Cycle



#### Recognizing the Unready Organization

Too often, executives believe that their companies are ready to take R&D global when in fact they are not. Symptoms typical of unready organizations include the following:

- ◇ Projects realized by the company's RDE-based centers require strong support from home-country centers, causing high coordination costs—as much as 20 percent of the RDE-based centers' workload in person-days.
- ◇ Middle managers from home-country R&D centers are unwilling to allocate time to transferring expertise to RDE-based centers or building global competencies, causing a need for significant numbers of expatriates—in the range of 10 percent of the RDE-based centers' total head count.
- ◇ Global activities are not included in RDE-based managers' routine responsibilities.
- ◇ Whatever the objectives assigned to the new RDE-based centers, the quality of RDE-based teams' deliverables is perceived as poor.
- ◇ R&D workloads are shifted to RDE-based centers on an ad hoc basis, to meet short-term cost targets rather than long-term development goals.
- ◇ There is an above-average attrition rate among local engineers in the company's RDE-based centers, who report that they don't feel "part of the big family," they don't "speak the same language," and they "feel disempowered because all decisions are made by home-country centers." Many interviewees told us that cultural issues arose between Western engineers and highly qualified Indian or Chinese engineers because their RDE-based R&D center suffered either from having too little workload transferred to it or from being limited to doing low-value-adding activities.

Where these symptoms prevail, the company's home-country R&D organization—as well as the company as a whole—have not been made ready for the strategic decision to globalize R&D. Ideally, the company should be fully prepared for and aligned with the global R&D agenda before any important distant R&D

centers are opened. But companies that find themselves suffering from unreadiness after having globalized their R&D can take action to resolve the problem.

### Addressing Unreadiness: The Four Golden Imperatives

In our experience—and in the experience of the companies we analyzed for this study—the issues that many MNCs worry about can almost always be managed. In addressing these concerns, MNCs can draw valuable lessons from the experiences of pioneering local challenger companies, as well as from those of other MNCs. The lessons can be summarized in four “golden imperatives” for taking R&D global:

- ◇ Globalize your research and innovation, not just your low-value engineering
- ◇ Establish a common language
- ◇ Implement a comprehensive global talent strategy
- ◇ Leverage local partners—without risking intellectual property leaks

**Globalize your research and innovation, not just your low-value engineering.** Our survey showed that companies that have been most successful in doing R&D in RDEs organize their research activities globally, capture ideas from everywhere, engage with top universities in all their hubs around the world, manage their R&D talent globally, and develop global platforms to compete with everyone from everywhere. To support these initiatives, they entrust their R&D centers in RDEs with significant responsibility for product development—and often with roles involving global leadership.

For instance, a Europe-based company that is a leader in ophthalmic materials organized its research into “gateways” around the globe. The mission of the gateways is to identify emerging technologies that may be of interest and to establish research collaborations with local universities and libraries. A leading U.S. electronic-equipment company is relying on its R&D center in India for global research into home automation solutions—a topic in which the center is far more advanced than the company’s U.S. R&D capabilities. A European telecommunications company is setting up a research center in South Korea to capture innovation on mobile multimedia services. And another European telecommunications company launched an R&D center in the Middle East to design products for RDE consumers not only in the region but around the globe.

The global organization model should define precisely the allocation of responsibility between the corporate center and the RDE-based centers for each key activity: budget setting, determination of client needs, definition of associated product specifications, and allocation of project management, know-how management, and competency management. For example, limiting local managers’ ability to support purchasing teams could undermine a company’s competitive advantage. The head of engineering of a global automotive OEM told us that his company cannot achieve the same level of sourcing localization as the best-performing MNC in the industry because his company’s RDE-based function has only limited purchasing responsibility. The group’s lack of authority to develop fully local suppliers means that the company ends up paying 5 percent more than its best-performing rival for localized components.

Similarly, a Chinese high-tech company obtains a better price from a supplier in China than a German company operating in China can get from the same supplier, because the German company’s product is designed in Germany to specifications that cannot be adapted to China, whereas the Chinese company adapts its requirements to make possible its local suppliers’ best performance. And poor global allocation of product responsibilities caused one automotive OEM to lose a potential global scale advantage because its product specifications were too differentiated from region to region. On the other hand, excessive corporate control can undermine the engagement of RDE-based engineers and hinder a new center’s ability to design products adapted to local markets.

Best practices in this area entail separating the classical hierarchical local responsibilities into multiple global roles. Project managers should be responsible for customer requirements, profitability, and on-time delivery; line managers, for engineering performance, capability development, and building know-how; and resource allocation managers, for the optimal use of the company’s global resources. It is important

for all these roles to have global reach. To make the global matrix work seamlessly, companies must delineate an explicit and appropriately balanced sharing of responsibilities along the project timeline and within product engineering “packages,” with formal guidelines for job sharing.

**Establish a common language.** Many companies are struggling to benefit from the “ideal” global R&D network, in which know-how flows effectively from location to location and project to project, so that the global network performs more efficiently than a single center.

In all the companies we studied, and in all the R&D globalization projects conducted by BCG, developing a common language among R&D centers has been a significant challenge. Creating a common language encompasses harmonizing selected technical processes, decision and information tools, technical standards, metrics, managers’ roles and responsibilities, definitions of work packages, and definitions of standard management tools. For instance, work packages are a technique for defining precisely what is expected, what is provided, what competencies are needed, and how long it will take to execute the task.

Having a common language means that all employees behave according to the same values and share the same set of practices and tools. Among the building blocks of a common language, we have identified the following:

- ◇ *The level of knowledge codification.* For example, automotive know-how relies heavily on implicit know-how accumulated by experts over time, whereas the software industry tends to push for more knowledge codification, thereby allowing R&D centers to ramp up faster, with fewer expatriates.
- ◇ *The working culture.* This includes written versus oral communications and output-driven versus activity-based management. We have observed that companies with management practices that are oral and (typically) activity based tend to spend up to 30 percent of their project time on management when portions of the project team are remote from each other, although the same companies spend only 10 to 15 percent of project time on management when the teams are collocated on the same floor. In contrast, companies with written and output-driven management practices tend to spend a consistent 10 to 15 percent of their project time on management, regardless of whether the teams are collocated or geographically dispersed. Establishing a “common ground” is considered much easier under the latter form of working culture.
- ◇ *The fungibility of standards.* Are standards common to the industry or company specific? The answer will determine how easily the company can interact with potential partners and avoid significant investment in transferring company know-how.
- ◇ *The company’s day-to-day tools.* These include its validation processes, know-how database, and decision-making tools. Successful companies dedicate resources to ensure the consistent evolution of the company’s tools around the globe and to avoid local divergence from the global standard.
- ◇ *The feeling of belonging to “one family.”* Successful companies invest time to ensure strong collaboration among sites. An observed best practice is linking 50 percent of management bonuses to effective cooperation with peers.

**Implement a comprehensive global talent strategy.** Perhaps most important, companies that run successful R&D programs in RDEs have comprehensive talent strategies that are aligned with their overall company strategies. For one thing, they seek high-quality local engineers with several years of experience to take responsibility for developing products that meet local needs. In addition, recognizing that competition for top R&D talent is keen, leading companies often choose to site their R&D centers in relatively expensive locations close to top-ranked universities and major industrial hubs. In contrast, companies focusing primarily on cutting costs generally locate their activities in remote areas where wages are lowest.

In truth, the availability and quality of R&D talent in RDEs can vary widely, and demand for high-quality R&D workers is creating a two-tiered talent pool. Leading companies have told us that they hire only graduates of tier-one universities to work as engineers and researchers in their centers, although such graduates are in short supply and command large salary premiums. The salaries of tier-one R&D workers

can be four times those of their tier-two peers—and as high as salaries in developed countries. As the increasing demand for top talent continues to outstrip supply, competition for these workers—and their salary requirements—will likely intensify.

One company that has come up with an inspired approach to securing—and retaining—highly qualified engineers is Embraer (Brazil), which recently surpassed Bombardier (Canada) as the global market leader in regional jets. Embraer decided to meet its need for specialized engineers by taking on the task of training them itself. In 2001, the company launched its own university, offering an 18-month course of academic and practical studies culminating in a master's degree for those whose final work is approved. The company pays for tuition, expenses, and a laptop for each student. By training the students itself, using the company's own software and equipment, Embraer can produce 100 to 150 highly capable new engineers a year. In the final six months of the course, students—with the guidance of supervisors, mentors, and other engineers—apply the skills they have learned to design an original product. This system ultimately helps to ensure the quality of Embraer service, as the company finds itself with an effective talent pyramid rather than a bottleneck. It also contributes to an above-market retention rate, because students are motivated to further their professional and personal growth.

Since the university was founded, Embraer has invested more than \$100 million in training engineers and has lost less than 10 percent of graduates from the program. This strategy is not only improving the company's retention rate but also helping it to grow, as the program attracts many applicants and becomes an important step in their professional development. Its popularity allows the company to select only the very best candidates for training and employment.

**Leverage local partners—without risking intellectual property leaks.** Local partners can play essential roles in helping MNCs grow their R&D centers fast—sometimes at rates above 15 percent per year. Local partners can help companies gain access to local research and innovation, supporting global companies' innovation-scouting processes. They can also orchestrate collaboration with local universities and laboratories on an ad hoc basis, establishing time-limited research contracts involving team members from both the company and the local partner.

AT&T, for instance, formed a joint venture with Tech Mahindra, a Mahindra & Mahindra subsidiary, to open an R&D lab in Bangalore for telecommunications research. Intel collaborated with Haier in 2007 to establish the Haier/Intel Research and Development Center for Innovative Products. The center brought together Intel's and Haier's R&D staff and systems and is dedicated to a single task: developing new products. Developers from the two companies are working on mobile devices, mobile Internet devices, telecommunications equipment, and digital home appliances, including PCs for rural areas.

Intel and Haier have also brought Suning Appliance, a leading retailer of home appliances in China, into the collaboration. Suning is responsible for sales and service platforms, Intel produces the CPUs and supplies marketing resources, and Haier provides branding, industrial design, and production capacity. This arrangement enables Haier to market its own brand-name computers designed specifically for local markets at low prices—but still incorporate cutting-edge technology.

All this collaboration entails some risk of IP leakage—especially in economies in which legal safeguards are not yet in place. Although protecting IP in RDEs remains challenging, companies have developed proven tactics to prevent the leakage of know-how. One pharmaceutical company, for example, has instituted rigorous employee-training programs to instill respect for IP, restricted access to sensitive data, developed a system whereby research files can be stored and accessed only on-site, and introduced retention initiatives that target experts.

A Chinese service company ensures that all employees complete rigorous IP-protection training. Moreover, all employees are issued electronic keycards that restrict access to specific labs and rooms within the facility. Additionally, lab computers have no data-recording capabilities and no outside Internet connections; chemical structures and data are prohibited in communal areas; and all research data, including notes, files, and electronic media, must be stored on-site and cannot be taken home by employees. Other, even more protectionist, strategies could include restricting critical know-how to expatriates in top positions.

## Making the Tough Tradeoffs

Whether your company is already doing R&D in multiple RDE locations around the world or only now beginning to go global, it is important first to define the objectives of your globalization of R&D and then to thoroughly assess your actual or proposed global R&D footprint and the functioning of the existing system. In most cases, your company will probably need to undertake a fundamental transformation of its current way of doing R&D. Our experience suggests that companies should take an integrated approach by shifting part of the R&D responsibility away from the historical headquarters to multiple global centers as they take their R&D global. Companies engaged in this process tend to move through four stages of maturity. (See Exhibit 5.)

The task of globalizing your R&D may involve exploring some tough tradeoffs between your ambition and the pace of transition. How does the *how* impact the *what*? Globalizing R&D is a long journey. What resources is your company willing to dedicate to globalization, to building a global family that speaks the same language?

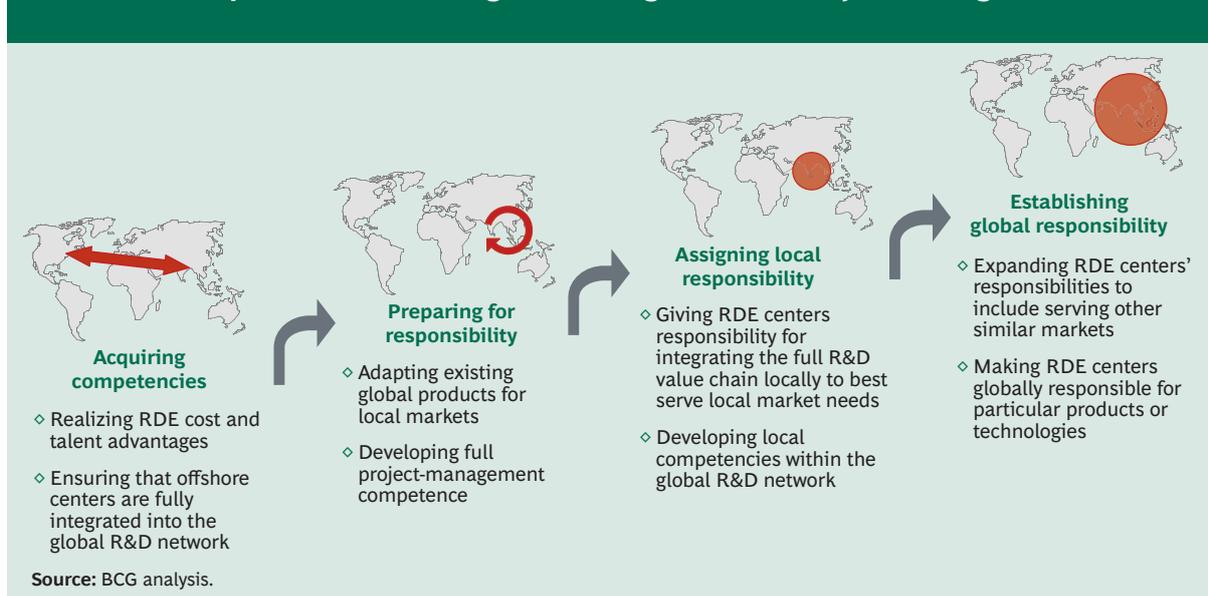
Globalization should become a top priority on your board of directors' agenda. One of the leading MNCs mentioned earlier in this paper ensured that it kept sustained attention on globalization by creating a dedicated position focusing on that topic. It also allocated hundreds of millions of dollars to launch its new R&D center in Bangalore. Significantly, it changed its incentive system, linking 50 percent of senior executives' bonuses to collaboration—especially that involved in ramping up the new center.

The decision to shift management's attention away from the company's existing business was not an easy one to make. However, the company reaped the fruits of its strategy in less than three years, as the new center started delivering high-quality products and solutions that proved successful in the market.

Companies that attempt to globalize R&D without making any changes in their home-country centers are doomed to failure. It is a common mistake to invest in starting up a new RDE-based center and just ask home-country managers to send activities there. This approach isolates the center within the R&D network and causes it to stagnate.

The current global economic crisis presents a double-edged opportunity: not only to reduce the cost of R&D but also to accelerate growth in RDE markets by acquiring key competencies or companies to penetrate those markets. This is a time not to "wait and see" but to take strong action to position your company for renewed growth.

### Exhibit 5. Companies Pass Through Four Stages of Maturity in Taking R&D Global



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## For Further Contact

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