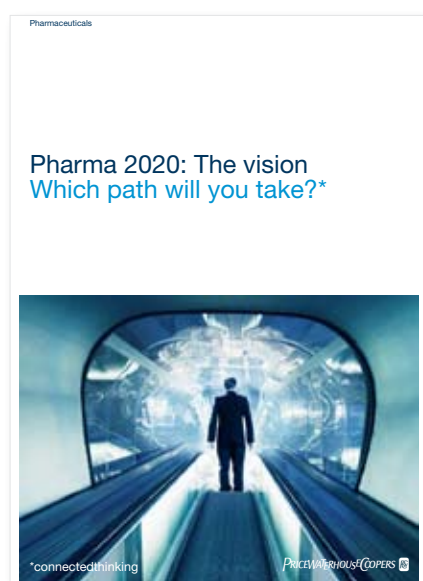


Pharma 2020: Challenging business models

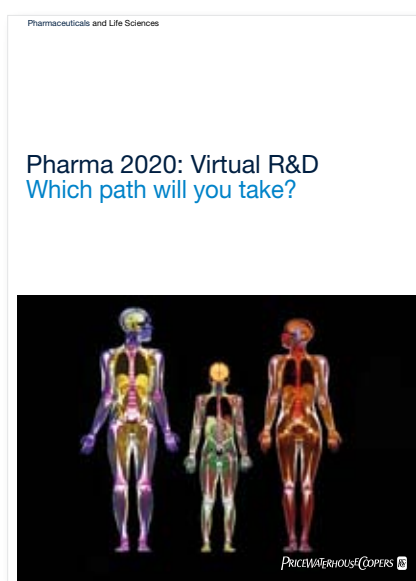
Which path will you take?



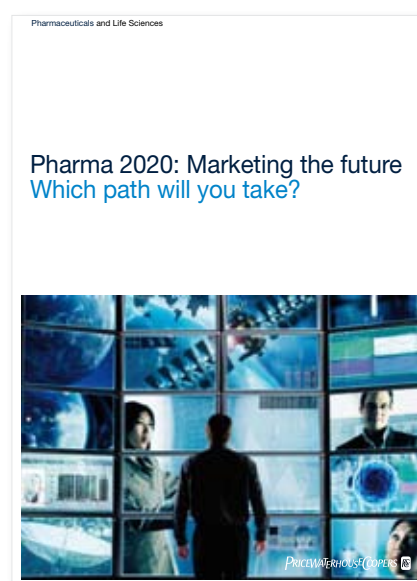
Previous publications in this series include:



Published in June 2007, this paper highlights a number of issues that will have a major bearing on the industry by 2020. The publication outlines the changes we believe will best help pharmaceutical companies realise the potential the future holds to enhance the value they provide to shareholders and society alike.



This report, published in June 2008, explores opportunities to improve the R&D process. It proposes that new technologies will enable the adoption of virtual R&D; and by operating in a more connected world the industry, in collaboration with researchers, governments, healthcare payers and providers, can address the changing needs of society more effectively.



Published in February 2009, this paper discusses the key forces reshaping the pharmaceutical marketplace, including the growing power of healthcare payers, providers and patients, and the changes required to create a marketing and sales model that is fit for the 21st century. These changes will enable the industry to market and sell its products more cost-effectively, to create new opportunities and to generate greater customer loyalty across the healthcare spectrum.

“Pharma 2020: Challenging business models” is the fourth paper in the Pharma 2020 series on the future of the pharmaceutical industry to be published by PricewaterhouseCoopers. This publication highlights how Pharma’s fully integrated business models may not be the best option for the pharma industry in 2020; more creative collaboration models may be more attractive. This paper also evaluates the advantages and disadvantages of the alternative business models and how each stands up against the challenges facing the industry.

All these publications are available to download at: www.pwc.com/pharma2020

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Introduction

The pharmaceutical marketplace is undergoing huge changes, as we indicated in “Pharma 2020: The vision”, the White Paper PricewaterhouseCoopers* published in June 2007.¹ These changes will have a major bearing on the kind of business models pharmaceutical companies need to employ.

Most Big Pharma companies have traditionally done everything from research and development (R&D) through to commercialisation themselves. But we predict that, by 2020, this model will no longer work for many organisations. If they are to prosper, they will need to improve their R&D productivity, reduce their costs, tap the potential of the emerging economies and switch from selling medicines to managing outcomes – activities few, if any, companies can accomplish on their own.

Even the largest pharmaceutical companies will have to collaborate with other organisations to develop effective new medicines more economically, help patients manage their health and ensure that the products and services they provide really make a difference. Moreover, they may have to step far outside the sector to find some of the partners they need.

We believe that two principal business models – federated and fully diversified – will emerge, as Pharma prepares for the future. We also think that the current economic downturn will accelerate the shift to these new models, both by reinforcing one of the key causal factors – the pressure on healthcare payers to maximise the value they get for the money they spend – and by opening up new opportunities to build or buy the networks that will be required.

In the following pages, we shall look at the main trends dictating the need for a more collaborative approach. We shall also evaluate the advantages and disadvantages of the alternative business models and how each stands up against the challenges facing the industry.

Profiting alone versus profiting together

Big Pharma’s traditional business model hinges on the ability to identify promising new molecules, test them in large clinical trials and promote them with an extensive marketing and sales presence (see sidebar, **What is a business model?**). In the predominant version of this model, a single company may employ contractors to supplement its own efforts, but it seeks to generate profits on its own. In essence, it pursues what might be called a “profit alone” path.

But, by 2020, the strategy of singlehandedly placing big bets on a few molecules, marketing them heavily and turning them into blockbusters will not suffice. As J.P. Garnier, former chief executive of GlaxoSmithKline, recently pointed out, it is a “business model where you are guaranteed to lose your entire book of business every 10 to 12 years”.²

More importantly still, it is a business model that will no longer meet the market’s needs. Management guru Clay Christensen has convincingly demonstrated how disruptive innovations in various industries have dismantled the prevailing business model, by enabling new players to target the least profitable customer segments and gradually move upstream until they can satisfy the demands of every customer – at which point the old

What is a business model?

The term “business model” is used to encompass a wide range of formal and informal descriptions of the core elements of a business. We have used the term in the following sense: *“A company’s business model is the means by which it makes a profit – how it addresses its marketplace, the offerings it develops and the business relationships it deploys to do so.”*

business model collapses.³

Pharma is currently undergoing just such a period of disruptive innovation. By 2020, most medicines will be paid for on the basis of the results they deliver – and since many factors influence outcomes, this means that it will have to move into the health management space, both to preserve the value of its products and to avoid being sidelined by new players. If it is to make groundbreaking new medicines for which governments and health insurers are prepared to pay premium prices, it will also have to build the relationships and infrastructure required to ensure that it can get access to the outcomes data they collect.

In short, the rules of the game are shifting dramatically. And, as Michael G. Jacobides, Associate Professor of Strategic and International Management at the London Business School, notes, when an entire “industry architecture” is transformed, it is not only “who does what” that changes, it is also “who takes what”.⁴

By 2020, no pharmaceutical company will be able to “profit alone”. It will, rather, have to “profit together”, by joining forces with a wide range of organisations, from

*PricewaterhouseCoopers’ refers to the network of member firms of PricewaterhouseCoopers International Limited, each of which is a separate and independent legal entity.

Apple's core strategy of collaboration

London Business School Professor Michael G. Jacobides has recently argued that successful companies do not compete in a sector; they shape the nature of a sector. They redefine the part of the value chain they occupy, and keep most of the value-add through the intelligent design of their collaboration with others in the sector.

Thus collaboration is not just a tool for doing the same things more effectively. At its most powerful, it can reshape an entire market, as Apple has shown. Apple redefined the mobile music sector by outsourcing the production of the devices and accessories, while retaining control of the iTunes software. In other words, it recognised that it could make money by creating and orchestrating a network of relationships – by controlling, rather than owning.

Apple used three specific tactics to change the rules of the game. It enhanced the mobility of the parts of the sector in which it has no presence, by establishing a small set of suppliers who know that they can be replaced at any time. It made itself into a bottleneck, by holding onto the music format and ensuring that files compatible with iPod can only be played on iPod devices. And it redefined who did what, by encouraging other companies to develop accessories rather than entering the accessories market itself. This has enabled it to benefit from the efforts of those that support its architecture, without making any capital commitment itself.

academic institutions, hospitals and technology providers to companies offering compliance programmes, nutritional advice, stress management, physiotherapy, exercise facilities, health screening and other such services.

Harking back to the future

Of course, some pharmaceutical companies have already tried to collaborate with other organisations. Rhone-Poulenc Rorer (now part of sanofi-aventis) created RPR Gencell, the world's first biotechnology network, in 1994.⁵ Many of the largest companies also established disease management programmes in the 1990s, although most of them were not very successful – primarily because healthcare payers were sceptical about industry-sponsored disease management.⁶ So we are not suggesting that the differences between these early efforts and the business models that are likely to prevail in 2020 will be completely black and white. Nevertheless, we think that two key differences will apply.

First, the technological and cultural pre-conditions to facilitate collaboration are now in place. In the mid-1990s, the Internet was still in its infancy and many of the tools that enable collaboration did not exist. Today, however, such tools are plentiful and the wider business culture has changed dramatically. IBM, Apple, Amazon and their ilk have demonstrated the power of open platforms, transformed corporate attitudes towards networking and shown that it is possible to reap much richer rewards by profiting together than by profiting alone (see sidebar, **Apple's core strategy of collaboration**).⁷

Second, by 2020, collaboration

will be a “do or die” requirement for pharmaceutical companies and healthcare payers alike. It will be essential for pharmaceutical companies to develop effective new medicines and address the demands of payers increasingly well equipped to measure what they are getting for their money; and essential for payers to cope with rapidly escalating healthcare costs.

Reading the signs

Various forces are changing the environment in which Pharma operates and the relative positions of the different players in the healthcare arena. These trends all point towards the need for much greater collaboration (see **Figure 1**).

The global healthcare bill is soaring, as the population ages, new medical needs emerge and the disease burden of the developing world increasingly resembles that of the developed world. Hence the fact that governments and health insurers everywhere are struggling to contain their expenditure. The issue is further exacerbated by the current economic turmoil that will put even greater financial pressure on the payer community.

Healthcare payers in the industrialised economies are already mandating what doctors can prescribe. The British National Health Service has also introduced a flexible pricing scheme under which the prices of new medicines can be lowered or lifted, depending on the outcomes they deliver.⁸ And US President Barack Obama's administration is moving towards opening up the US market to much greater competition from generics, as well as allowing the importation of cheaper medications from “safe” countries.⁹

The developing world will soon come under equal pressure. The emerging economies will experience the most rapid growth in demand for medicines over the next 11 years, but many (if not all) of them will struggle to fund this demand. The Chinese government has, for example, undertaken to introduce a universal healthcare system with a level of cover that does not exceed

the country's current economic development. However, it is hard to see how the plan will not entail a substantial increase in China's healthcare costs.¹⁰

Healthcare payers in both the developed and developing worlds are also beginning to measure outcomes much more carefully and to emphasise the importance of prevention. By 2020,

they will expect the industry to go "beyond the medicine" by providing prophylactics and healthcare packages designed to help patients manage their health. Moreover, patients will play a much bigger role in determining how they are treated, as the money they spend on medicines likewise rises and the Internet gives them access to more information. Armed with insights

Figure 1: The key trends now emerging and their implications for Pharma

Trends		
<p>Market trends</p> <ul style="list-style-type: none"> • Patients are becoming better informed • Patients are picking up a bigger share of the bill • Demand for personalised medicine is increasing • Patients want cures, not treatments • The emerging markets are becoming more important 	<p>Health and healthcare trends</p> <ul style="list-style-type: none"> • The burden of – and bill for – chronic disease is soaring • Healthcare payers are establishing treatment protocols • Pay-for-performance is on the rise • The boundaries between different forms of care are blurring • Financial constraints on payers are increasing 	<p>Scientific and technological trends</p> <ul style="list-style-type: none"> • R&D is becoming more virtualised • The research base is shifting to Asia • Remote monitoring is improving rapidly
Implications		
<p>Pharma will need to go "beyond the medicine"</p> <ul style="list-style-type: none"> • Pharma will be paid for outcomes, not products • Outcomes data will drive healthcare policy • Prevention will gain a higher healthcare profile • Pharma will need to offer "medicine-plus" packages of care • Pharma will have to adopt more flexible pricing strategies 	<p>R&D will need to go beyond the lab</p> <ul style="list-style-type: none"> • Pharma will need access to outcomes data • Pharma will have to work with technology vendors to virtualise R&D • Pharma will need a wider, more multi-disciplinary skills base • Pharma will need to expand its presence in Asia • Pharma will need to demonstrate "real" value-for-money 	<p>The Pharma and healthcare value chains will become much more intertwined</p> <ul style="list-style-type: none"> • Pharma will have to work more closely with the regulators • Pharma will have to collaborate with payers and providers to perform continuous trials • Pharma will have to collaborate with numerous service providers to deliver packages of care

Business models based on collaboration

Emerging collaborative networks

Several pharmaceutical firms have already begun to use more collaborative models. One such instance is Lilly, which is currently transforming itself from a traditional fully integrated pharmaceutical company into a fully integrated pharmaceutical network, so that it can draw on a wide range of resources beyond its own walls. Lilly hopes that teaming up with other organisations to create virtual R&D programmes will enable it to get better access to innovation, reduce its costs, manage risks more effectively and enhance its productivity. For example, the Chorus Project is a virtual organisation to take molecules quickly to Proof of Concept. Lilly also uses external networks comprising third parties such as Piramal Life Sciences, Hutchison MediPharma, Suven Life Sciences for the development of molecules.

Swiss biopharmaceutical development specialist Debiopharm has pioneered a more radical approach. The company in-licenses promising new candidates from academic institutes and biotech companies, develops them and then out-licences them to Big Pharma. Debiopharm's successes include three products with combined global sales of more than US\$2.6 billion in 2007.

Most of the collaborative models that currently exist are limited to R&D. But it is easy to envisage various other permutations, including networks focusing on different therapeutic areas and covering everything from R&D through to sales and marketing; networks focusing on different enabling technologies, such as genomics, proteomics and stem cell research; and networks focusing on the management of outcomes in specific patient segments.

gleaned from educational websites, discussion groups and blogs, they will not only want better, safer medicines, they will also want a range of satellite services they can tailor to their individual needs.

If Pharma is to accommodate these changes in the marketplace, it will have to collaborate much more extensively – as it will, indeed, to capitalise on some of the scientific and technological trends that are now emerging. The research base is shifting, for example. Non-OECD economies accounted for 18.4% of the world's R&D in 2005, up from 11.7% in 1996. The number of patents filed by Asian researchers also increased significantly over the same period, albeit from low levels.¹¹ So the industry will have to forge much closer links with the most reputable centres of scientific excellence in these countries.

Meanwhile, new technologies are providing new sources of knowledge. Home surveillance systems, portable devices and implants, linked to online and wireless networks, will facilitate the monitoring of patients on a real-time basis outside a clinical setting. But if Pharma is to get access to the outcomes data remote monitoring generates, it will have to collaborate with the hospitals and clinics that capture this information.

Technological advances will likewise enable the virtualisation of large parts of the R&D process, as we explained in "Pharma 2020: Virtual R&D".¹² Some of the leading pharmaceutical companies are already exploring the potential of semantic technologies and computer-aided molecule design. Various academic institutes and bioinformatics firms are also building computer models of different organs and cells, with the ultimate aim of creating a "virtual man". But developing such a model will require

a monumental collaborative effort far exceeding that required to complete the Human Genome Project.¹³

The economic case for change is clear. The decline of revenue growth and margins result in reduced shareholder returns which will force pharmaceutical companies to adapt. There is a compelling case for increased collaboration. Delivering drug therapies to payers and patients in a 2020 world will require new skills, technologies and channels - the infrastructure required will be uneconomic for anyone, other than the largest players, to build internally.

To sum up, the key social, economic and technological changes currently taking place in the pharmaceutical and healthcare arena will all necessitate the development of multinational, multi-disciplinary networks drawing on a much wider range of skills than Pharma alone can provide. The constraints that previously hindered organisations from collaborating over distance are simultaneously evaporating – paving the way for the use of new business models (see sidebar, **Emerging collaborative networks**).¹⁴ In the next sections, we shall look at the implications of broadening the value proposition, the various models that exist and the different opportunities and risks they present.

Broadening the value proposition and managing the value chain

Pharma currently creates value by developing new medicines (and a relatively limited number of diagnostics). Collaborating much more closely with the key stakeholders in the healthcare sector will enable the industry both to expand its remit and to align its

value chain more closely with those of healthcare payers and providers.

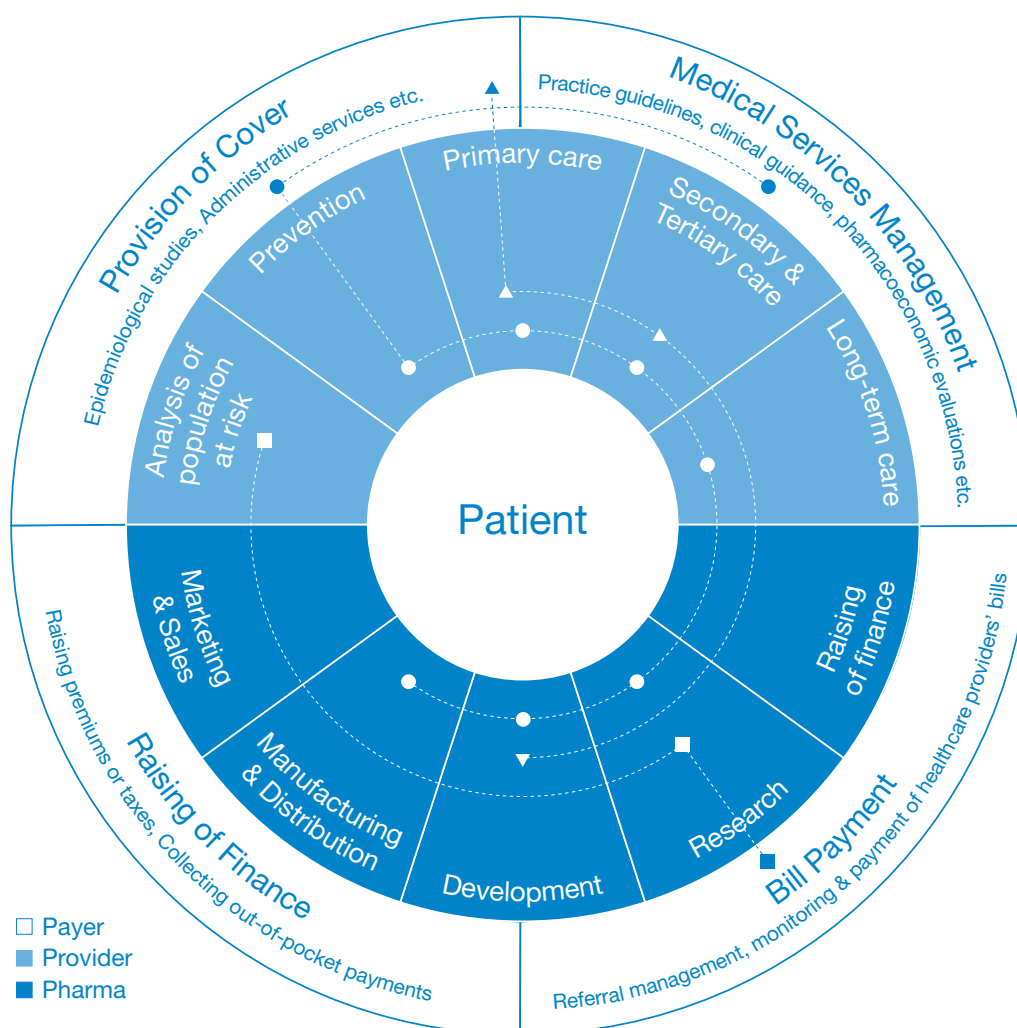
As we indicated in more detail in “Pharma 2020: Marketing the future”, the value chains of the three parties are heavily interdependent. The value *payers* generate depends on the policies and practices of the providers they use. The value *providers* generate depends on the revenues payers raise and the medicines Pharma makes. And the value *Pharma* generates depends

on getting access to the patients whom providers serve and income from the payers who fund those providers. Yet the relationship between the different players is often quite antagonistic and, while they continue to clash, they are struggling to retain their respective goals.¹⁵

If Pharma broadens its value proposition, it can begin to close the gap. Creating feedback loops to capture outcomes data will help it to establish

a more dynamic relationship with healthcare payers and providers. So, too, will building the networks required to deliver healthcare packages that encompass a wide range of products and services from numerous different suppliers. This will ultimately result in the convergence of the separate, linear value chains that exist today and the emergence of a single, circular value chain (see **Figure 2**).

Figure 2: By 2020, the pharmaceutical, payer and provider value chains will be much more closely intertwined



Source: PricewaterhouseCoopers

Choosing between different collaborative models

One vital question remains, however; namely, what sort of model should companies use to effect these changes? We believe that two principal models – federated and fully diversified – will emerge. We have also identified two variants of the federated model. In the virtual version, a company outsources most or all of its activities; in the venture version, it manages a portfolio of investments (see **Figure 3**). The two

models are not mutually exclusive. A fully diversified company might choose to use a federated model for certain aspects of its business, and vice versa. But we think that the federated model will ultimately dominate, primarily because it is quicker and more economical to implement.

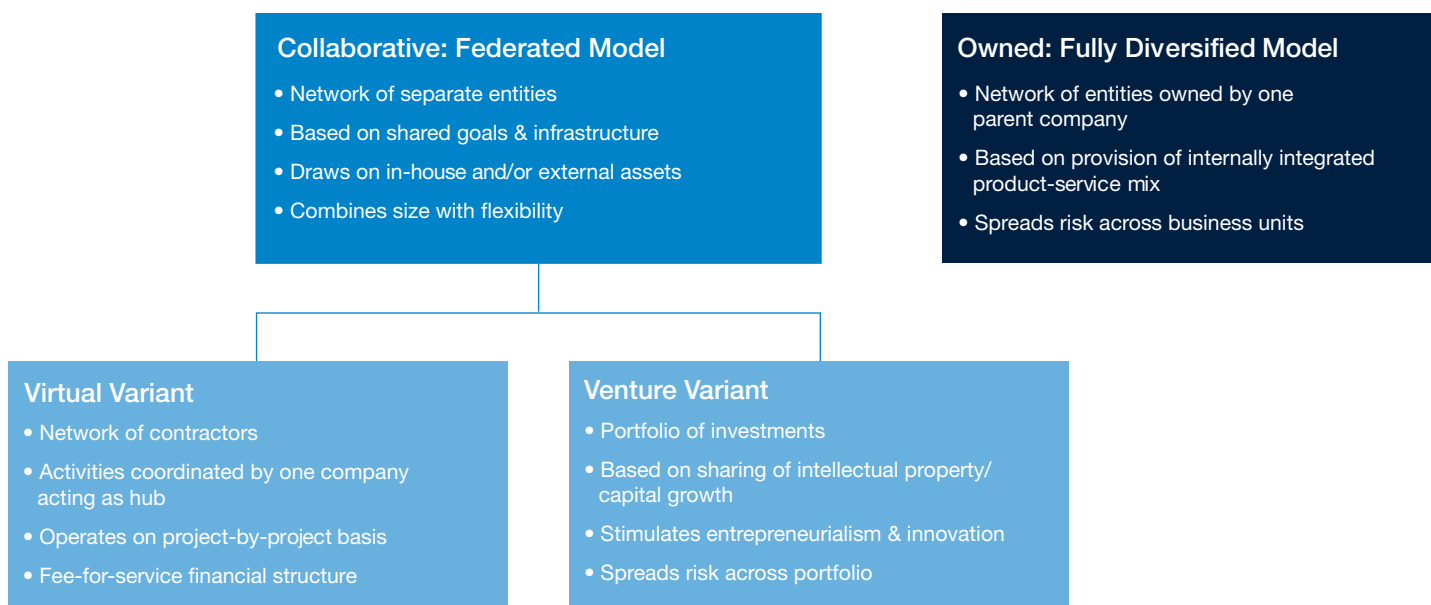
The federated model

In the federated approach, a company creates a network of separate entities with a common supporting infrastructure. These might include universities, hospitals, clinics,

technology suppliers, data analysis firms and lifestyle service providers based in numerous countries. They might also include business units from within the company itself, which it places at “arm’s length” (see **Figure 4**).

The various participants have a mutual goal – such as the management of outcomes in a given patient population. They also share funding, data, access to patients and back-office services, and this interdependence is the glue that holds them together. They are rewarded for their efforts using measures like increased life expectancy

Figure 3: The different business models



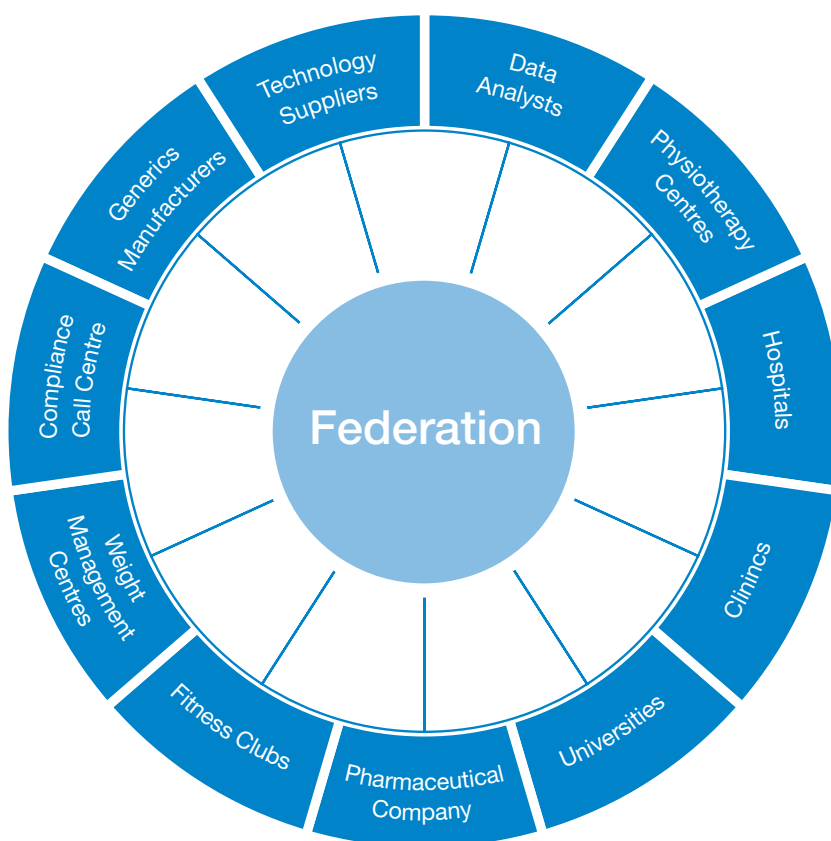
Source: PricewaterhouseCoopers

or quality-adjusted life years. And each is rewarded in a manner that reflects the evidence base for the contribution it has made (see sidebar, **How should the cake be sliced?**).¹⁶

The federated model provides a framework for creating integrated packages of products and services, and thus diversifying beyond a company's core offering. It also combines the benefits of nimbleness and size. It would enable each player to build a specific area of expertise, establish a competitive advantage as a result of that expertise and sell its products, knowledge or skills, leaving activities that are better performed by others to its partners within the federation.

More importantly still, the federated model might encourage greater cross-fertilisation and deliver bigger improvements in performance, without forfeiting any flexibility. The stronger members of the network could help the weaker ones to improve – since federations have an incentive to perform well as a whole – but they could also replace any participant that persistently underperforms.

Figure 4: The federated model



Source: PricewaterhouseCoopers

How should the cake be sliced?

It may sometimes be hard to measure the value different participants have created for two reasons. First, the parties in any collaboration typically value the contributions they have made more highly than those of their partners. This is a problem that can be solved with watertight contracts, robust performance indicators, good governance and a proper audit trail. Second, assessing the impact of different forms of intervention can be very difficult indeed.

Medicines, diet and exercise all play a role in managing cardiovascular disease, for example, but precisely how

much? Various studies have established some parameters. They show, for instance, that high-frequency exercise can improve the cardio-respiratory fitness of patients with heart disease by at least 10% – and that, in turn, can reduce the mortality rate by 15%. We believe that many more studies to evaluate the effectiveness of non-pharmacological interventions will be conducted in future, as healthcare payers everywhere focus more heavily on preventative measures.

This approach is essentially a more complex variant of the co-development and co-distribution agreements we have today. In order for companies to work

better collaboratively it is essential to define upfront measurable components of delivery and value.

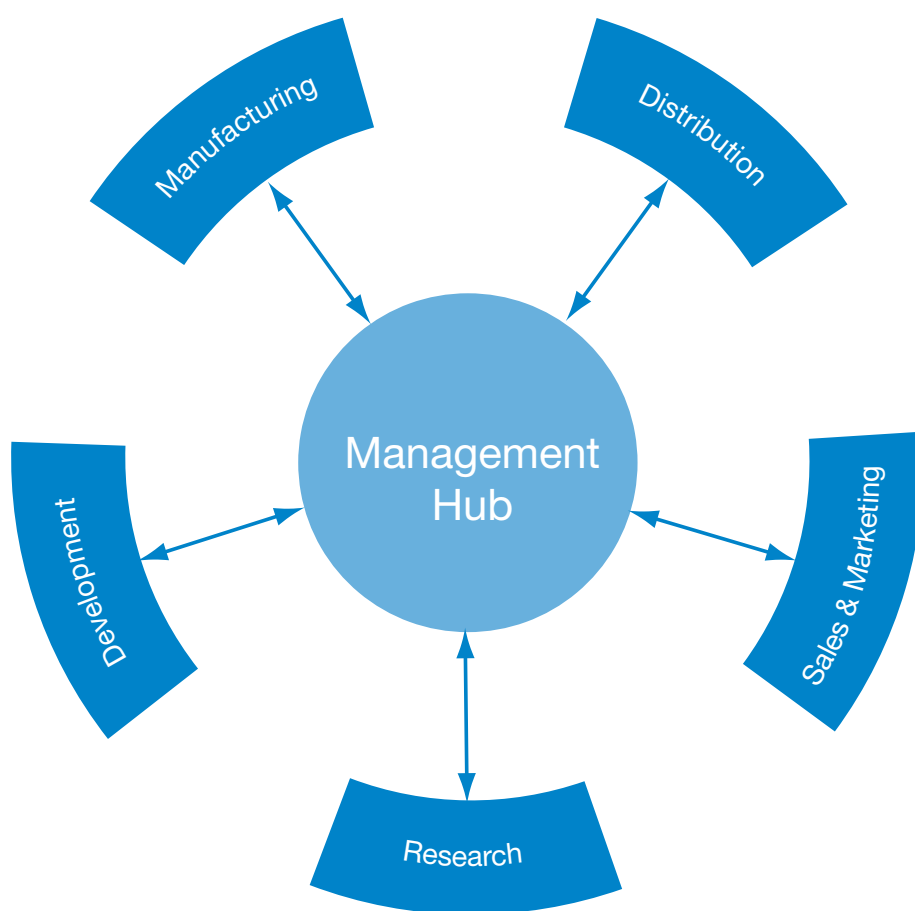
Defining the value provided by each player in the federation will then inform how each party should be rewarded – this will be a combination of theoretical analysis and monitoring of outcomes and benefits to the patient. Clearly to avoid the risk of litigation or the constraints of exclusivity, the federation needs to be underpinned by mutual trust between all parties. However, there are several examples of where this has worked effectively such as a franchising model where the value of a brand is measured and rewarded.

The virtual variant of the federated model

In the virtual variant of the federated model most or all of a company's operations are outsourced and the company itself acts as a management hub, coordinating the activities of its partners (see **Figure 5**). Several industries have already adopted some aspects of this model. The semiconductor industry typically outsources its manufacturing in order to concentrate on product development, for example, and a number of companies in the medical devices sector are now following suit.¹⁷ Similarly, strategic outsourcing of design and manufacture to suppliers has redefined manufacturing functions within industries such as aerospace, computing and electronics.

Most large pharmaceutical companies also use external contractors to supplement their in-house resources, but very few firms have gone any further (see sidebar, **Shire's virtual vision**).¹⁸ There are very good reasons why pharmaceutical companies should outsource their R&D, manufacturing and promotional activities where third party alliances can provide a wider range of opportunities, specialist skills and market access. A pharma company can then focus on the value adding functions where they can leverage on their relationships, scale and market knowledge – i.e., project management, business development, regulatory affairs, intellectual property management and the formation of good relationships with key opinion leaders

Figure 5: The virtual variant of the federated model



Source: PricewaterhouseCoopers

Shire's virtual vision

Shire Pharmaceuticals is the epitome of a virtual company. It outsources almost everything, from discovery to medical monitoring to data management to statistics to medical writing. With the exception of its genetic therapy division, every product it develops has been purchased from an outside source, via in-licensing or acquisition.

and healthcare providers.

The virtual variant of the federated model has other advantages, too. It would enable companies to reduce their initial capital outlay, convert some of their fixed costs into variable costs, utilise their resources more efficiently and become more flexible. Equally important, it might help the industry leaders to expand into new product/service areas or geographic markets without resorting to further mega-mergers (and thus facing the huge challenges associated with integrating two formerly separate entities) or succumbing to the corporate bureaucracy that so often strangles innovation.

However, the virtual variant also comes with some significant drawbacks. The balance of power might shift to suppliers, as it has done to a certain extent in the automotive industry, where a number of Tier 1 suppliers now manage their own supply chains. Alternatively, a major supplier might get into financial difficulties and start offering an inferior service or even default on its obligations altogether. But such risks can often be managed by using multiple suppliers, wherever possible.

Some pharmaceutical companies might also see their earnings diluted, since every participant in the value chain would expect a return for the services it provides. Theoretically, this should not happen, since specialist contractors typically have lower costs than integrated pharmaceutical companies. Indeed, according to one

study, a company that performs certain preclinical development activities in-house can expect to pay more than double what it would pay if it completely outsourced these activities to a third party.¹⁹ But a shortage of top-class service providers or experts in particular areas such as biological manufacturing could drive prices up.

The venture variant of the federated model

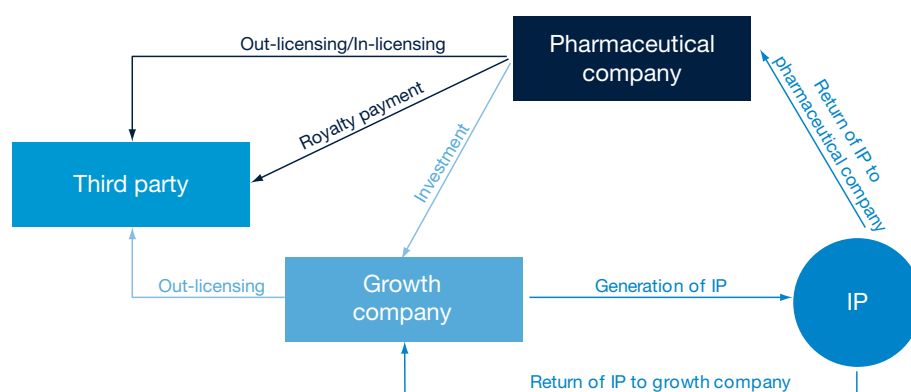
The venture variant of the federated model entails investing in a portfolio of companies in return for a share of the intellectual assets and/or capital growth they generate, rather than outsourcing specific tasks. Special purpose vehicles are sometimes used to manage such investments, because they offer several advantages in terms of risk sharing and intellectual property protection.

A pharmaceutical company might choose to concentrate its investments in a particular therapeutic area or

spread them across a number of areas in order to minimise its risk. At the end of the investment period, it might either claim the intellectual property that has been generated or out-license it to a third party. Alternatively, the originating company (or companies) might retain the intellectual property, commercialise it and pay the sponsoring company a return on its investment (see **Figure 6**).

GlaxoSmithKline has used a version of the venture structure for many years. SR One, its evergreen fund, was established in 1985 and has now invested more than US\$500m in some 30 private and public biotech companies focusing on drug discovery, development and delivery.²⁰ Other Big Pharma companies, such as Novartis and Pfizer, have also set up corporate venture capital funds,²¹ and AstraZeneca spun off part of its gastrointestinal research operation into a new company backed by a consortium of private equity firms.²² US investment bank Goldman Sachs

Figure 6: The venture variant of the federated model



Source: PricewaterhouseCoopers

Portfolio of pills

Goldman Sachs has funded a new “research pool” into which pharmaceutical companies could place a range of experimental medicines in a single therapeutic area in early-stage Phase I and II trials. External experts, including scientists, chemists and clinical research organisations, would work alongside scientists from the originating companies. The bank argues that this approach would reduce the costs and bureaucracy associated with Big Pharma. It might also allow competing companies working on similar drugs to pool their resources, rather than duplicating each other’s efforts.

In April 2009, GSK and Pfizer announced that they intend to combine resources to set up a new spin off firm dedicated to the HIV.

The structure of the deal gives a majority 85% stake to GSK and 15% to Pfizer with an increase of Pfizer’s stake to 24.5% if all milestones are reached. The new firm, with a current revenue of £1.6 billion has a portfolio of 11 products and a drug-discovery pipeline of 17. R&D services will be contracted directly from GSK and Pfizer to develop these drugs with investment from the new firm. In return, the new firm will have exclusive rights of first negotiation with respect to HIV drugs developed by the two pharma majors. The rationale for the venture is that the new firm will be more sustainable and broader as a combined venture and that there are synergies on the commercial side.

has already dipped a toe in the water with its own venture fund (see sidebar, **Portfolio of pills**).²³

Nevertheless, all these initiatives are very small; between 2003 and September 2006, corporate venture capitalists invested just over US\$1.5 billion in the US life sciences sector,²⁴ a fraction of the estimated US\$11-15 billion the member companies of the Pharmaceutical Research and Manufacturers of America spent on discovery in 2006 alone.²⁵ Most such ventures are also confined to research, although the same approach could be applied to development, manufacturing, distribution, and marketing and sales.

So what might the venture variant deliver, if it were implemented on a much larger scale and extended to other parts of the value chain? It would alleviate the funding challenges in the biotech sector, where companies often struggle to raise a second or third round of financing because venture capitalists want to exit before they can commercialise their products. These challenges have been exacerbated by the credit crunch and are likely to get even worse in the current economic recession.²⁶ It would also allow promising start-ups to capitalise on Big Pharma’s experience without being stifled by a Big Pharma culture – both

trends which might stimulate greater innovation.

Similarly, it would provide incentives for traditional contract service providers to make strategic, long-term investments – as Lonza did, when it collaborated with Genentech to build a manufacturing plant in Singapore.²⁷ And it would enable pharmaceutical companies to explore numerous new avenues of R&D, or expand their global manufacturing and marketing capacity, without investing too heavily in any one project.

However, venture structures are not without their challenges. For a start, the skills involved in managing a portfolio of holdings are very different from those involved in assessing and pursuing potential research leads, as is the timeframe venture capitalists use to realise a return. So Big Pharma would need to recruit people with the necessary expertise and manage any conflicting objectives very carefully.

Moreover, any company that operated a large corporate venture capital fund alongside its own research portfolio would have to consider the financial implications very carefully. R&D expenditure is typically recorded on a company’s profit and loss statement, for example, whereas investments are registered on the balance sheet and subject to annual impairment reviews. This has an impact on how companies are taxed and on how they are valued by the stock markets. Similarly, if a company’s risk profile increases because it has less control over research that is conducted outside its own walls, its cost of capital will increase.

The fully diversified model

The fully diversified model is one in which a company expands from its core business into the provision of related products and services, such as diagnostics and devices, generics, nutraceuticals and health management (see **Figure 7**). Johnson & Johnson is Pharma's leading exponent of this approach. It is now the world's largest consumer health company, following the US\$16.6 billion acquisition of Pfizer's over-the-counter business in December 2006.²⁸ It is also the third-largest biologics and sixth-largest pharmaceutical company, has an extensive medical devices and diagnostics operation,²⁹ and recently started building a wellness and prevention platform, with the purchase

of HealthMedia, a web-based "health coach".³⁰

A number of other companies are now following suit. Novartis has spent nearly US\$25 billion beefing up its vaccines, generics and eye-care products operations over the past three years, for example.³¹ Roche is drawing on its expertise in molecular diagnostics to develop a consumer product test for measuring indoor allergens.³² And GlaxoSmithKline has announced plans to "diversify and de-risk" by focusing more heavily on vaccines, consumer health and the emerging markets.³³

The fully diversified model has several merits, not least the fact that it enables companies to reduce their reliance on blockbuster medicines and spread their risk by moving into other market spaces

with the potential to act as a bulwark against generic competition. Like the federated model, it also provides a means of moving into outcomes management by offering combined product-service packages and playing to the growing political emphasis on prevention rather than treatment.

In addition to these advantages, it might offer opportunities both to develop more powerful brands and to acquire a better corporate image. Numerous studies show the extent to which Pharma's reputation has declined over the past decade.³⁴ Supplementing its products with "wellness" services might help a company to create a more positive impression, although it would have to handle its relations with the regulators, healthcare providers and patients very carefully.

Figure 7: The fully diversified model

Ethical Pharmaceuticals	Diagnostics & Devices	Generics	Consumer Health	Health Management
<p>Mass-Market</p> <ul style="list-style-type: none"> • Primary-care products (including patches, inhalants and controlled-release implants) • Poly-pills <p>Specialised-Market</p> <ul style="list-style-type: none"> • Biologicals • Orphan drugs • Vaccines 	<ul style="list-style-type: none"> • Molecular testing • Clinical biomarkers • Medical devices 	<ul style="list-style-type: none"> • Branded generics • Commodity generics • Super-generics • Follow-on biologicals 	<ul style="list-style-type: none"> • Over-the-counter medicines • Consumer diagnostics • Nutraceuticals 	<ul style="list-style-type: none"> • Patient education • Delivery and drug administration services • Monitoring and counselling • Physiotherapy • Nutritional advice • Wellness management

Source: PricewaterhouseCoopers

However, the fully diversified model has drawbacks, too. It requires a substantial investment in new equipment, premises and personnel, as well as major cultural changes, since the provision of products is very different from the provision of services. It might also create new risks by distracting management’s attention from the core business – and even alienate investors, who often prefer to spread risk themselves.

Charting a successful course

Clearly, the business model, or models, a company chooses will depend on its individual circumstances, including the particular challenges it faces, the expertise it possesses and the markets in which it wants to operate. A company that focuses exclusively on ethical pharmaceuticals might find it harder to diversify than one that is already experienced in managing multiple areas of activity, for example. Moreover, federations typically place greater demands on senior management than conventional organisational hierarchies.

Creating and supervising a cross-border, cross-disciplinary network of external relationships can be very time-consuming – and it is often more difficult to identify, monitor and manage risks. The various parties may have different cultural characteristics, different ways of communicating and different expectations, some of which may change over time. An individual manager’s authority over the other

participants in the network is also likely to be relatively limited. In a heavily regulated industry such as Pharma, any diminution of managerial control has serious implications. So it is crucial to establish clear goals and guidelines for the governance and funding of such arrangements, and for the division of any intellectual assets they generate, before signing on the dotted line.

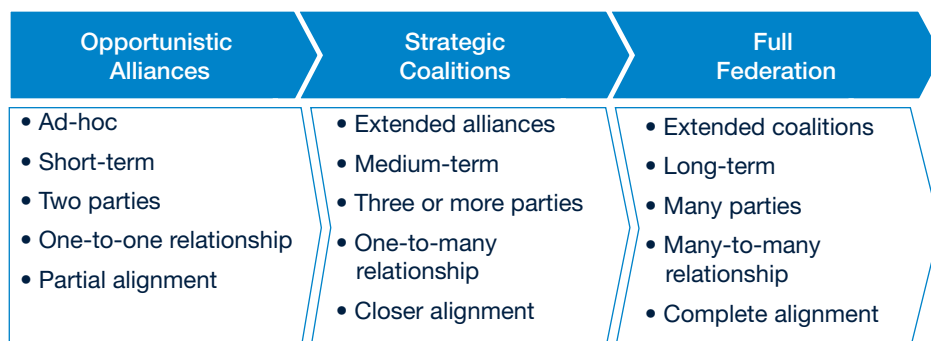
Disrupting the existing order can have a major impact on a company’s short-term performance, too. When GlaxoSmithKline established its Centres of Excellence for Drug Discovery, the upheavals the R&D function was experiencing affected its pipeline for at least 18 months.³⁵

We think that many companies which choose the federated model will therefore adopt a progressive approach. They will start with opportunistic alliances; use the most successful alliances as building blocks to create more strategic, longer-lasting coalitions; and, finally, use the most successful

coalitions to create a fully federated network of long-term partners (see **Figure 8**). Taking incremental steps will not only help them to identify the organisations with which they can work most effectively, but also give them time to establish the technological infrastructure that is essential to manage the interfaces between two or more different parties.

Most companies will also have to recruit or train people with new skills. They will, for example, need researchers who can understand commercial imperatives; financial analysts who can assess different investment opportunities with the discipline of venture capitalists; senior executives who can negotiate and oversee alliances; supply chain managers who can supervise large networks of service providers; and health economists who can measure the value of the contributions the respective parties make. Those that choose to enter the health management space directly will also have to hire physiotherapists,

Figure 8: The path to federation is likely to be gradual



Source: PricewaterhouseCoopers

dieticians, counsellors and numerous other people with skills that were formerly outside Pharma's domain.

Finding people with the appropriate expertise will not be easy. Many companies will therefore have to adopt new talent management strategies, as well as ensuring that the performance measures and incentive systems they use support the behaviour they want to encourage.

Conclusion

Pharma's fully integrated business model enabled it to profit alone

for many years – and to profit very successfully, as its track record in rewarding shareholders shows. The top companies saw their market value soar 85-fold between 1985 and 2000.³⁶ But this model is now under huge pressure and, by 2020, it will not work. If the industry is to improve its performance in the lab, reduce its costs, serve the emerging markets more effectively and make the transition from producing medicines to managing outcomes – as healthcare payers, providers and patients are increasingly demanding – it will have to collaborate with other organisations, both inside and outside the sector. It simply cannot do everything itself. In addition there is

a clear economic rationale for greater collaboration (See sidebar, **Show me the money**).

Moreover, many companies will need to move fast. As the healthcare landscape changes and scientific expertise becomes less important than the ability to manage networks, the scope for competition from new entrants will increase. Several non-pharmaceutical companies have already entered the arena. Vodafone has, for example, joined forces with Spanish telemedicine provider Medicronic Salud and device manufacturer Aerotel Medical Systems to offer a wireless home monitoring service.³⁷ Similarly, British insurance

Show me the money

There is plenty of evidence pointing to big opportunities for savings to be made through early intervention and tighter management of patients and treatments. The federated model will make these savings more systematic and predictable, rewarding participants based on the value that they create. Aligning risk and incentives appropriately is key to realising these benefits. For example:

- A study by the RAND Corporation estimated the financial savings from having 100% participation in disease management programmes for four diseases (asthma, chronic obstructive pulmonary disease, diabetes and congestive heart failure) in the US. They estimate the net savings to the health system to be \$28bn (around 2% of total US health expenditure), with additional benefits to the economy in terms of work days saved.³⁸
- Britain's Audit Commission examined the scale of adverse events in UK hospitals. They found that 10.8% of patients on medical wards experience an adverse event, 46% of which are preventable. One third of the adverse events lead to greater morbidity or death and cost the UK's NHS £1.1bn a year.³⁹
- The five most costly conditions collectively account for 32.7% of overall healthcare expenditure. As we highlighted in "Pharma 2020: The vision", improving patient compliance with enhanced treatment regimes by collaborating with other support services is a key enabler to drive the healthcare bill down. Further, some commentators have suggested giving patients financial incentives to improve compliance.⁴⁰
- In 2009, Cisco Systems reported healthcare cost savings of \$2.6m from a programme of on-site medical clinics covering 6,000 employees supported by integrated healthcare technology systems, chronic disease management, and health coaching.⁴¹

Key questions for senior management

- What is our current business model? Does it play sufficiently to our strengths?
- What kind of company do we want our company to be?
- Will our current business model enable us to expand into new markets – be these new products, services or countries – and satisfy the expectations of our customers in 2020? If not, what sort of business model will we need?
- What is the size of the gap and how can we reduce it as rapidly as possible?
- Do we have a clear picture of the opportunities and risks entailed by each of the alternatives available to us?
- Do we have a plan in place that will enable us to move forward quickly, while maximising the opportunities and minimising the risks?

giant Prudential is collaborating with Virgin Active Health Club to offer a critical illness policy that provides subsidised gym membership and rewards people who exercise regularly by reducing their premiums.⁴² If the leading pharmaceutical companies cannot change their business models rapidly, such firms may ultimately feature more prominently on the healthcare scene than they themselves.

The transition will not be easy, for collaborative business models are far more complex than the integrated model that has previously prevailed. Moreover, no one model will suit every company. Each will need to assess its position, options and future course in light of its individual strengths and needs (see sidebar, **Key questions for senior management**).

However, the prospects for any pharmaceutical company that can make the switch are very promising. The potential for reallocating resources to deliver better outcomes and maximise the effectiveness of expenditure on healthcare is considerable in most healthcare systems. Research recently completed by Britain's Audit

Commission shows, for example, that annual spending on the treatment of diabetes ranges from less than £8 to over £30 (US\$11.9-US\$44.6) per head.⁴³ But differences in the prevalence of diabetes account for only 8% of this variation – and higher expenditure does not result in fewer emergency hospital admissions.⁴⁴

To date, Pharma has focused on the profits it can earn from the estimated 10-15% of the health budget that goes on medicines.⁴⁵ Yet there are many opportunities to generate revenues by improving the way on which the remaining 85-90% is spent. It is these opportunities the industry will need to address in the brave new world of 2020.

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References

1. PricewaterhouseCoopers, "Pharma 2020: The vision – Which path will you take?" (June 2007).
2. Kathryn Phelps, "Mergers May Buy Time, But Fundamental Changes Necessary, GSK's Garnier", *The Pink Sheet* (February 26, 2007), p. 11.
3. Clayton M. Christensen, "The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail" (Boston: Harvard Business Press, 1997).
4. Michael G. Jacobides, Thorbjørn Knudsen & Mie Augier, "Who Does What and Who gets What: Capturing the Value from Innovation", AIM Executive Briefing (2006), accessed July 27, 2009, <http://faculty.london.edu/mjacobides/assets/documents/JKAbriefingAIMnov06.pdf>
5. "Rhône-Poulenc Forms Network To Develop Gene and Cell Therapies", *Oncology News International*, Vol. 4, No. 1 (January 1, 1995), accessed December 8, 2008, <http://www.cancernetwork.com/display/article/10165/97578>
6. The Boston Consulting Group, "Realizing the Promise of Disease Management: Payer Trends and Opportunities in the United States" (February 2006), p. 9.
7. Michael G. Jacobides, Thorbjørn Knudsen & Mie Augier, "Benefiting from Innovation: Value Creation, Value Appropriation and the Role of Industry Architectures", *Research Policy*, Vol. 35 (2006): 1200-1221.
8. BBC News, "Deal reached on NHS drug prices" (November 19, 2008), accessed November 28, 2008, <http://news.bbc.co.uk/1/hi/health/7737027.stm>
9. "Barack Obama and Joe Biden's plan to lower health care costs and ensure affordable, accessible health coverage for all" (2008), accessed November 10, 2008, <http://www.barackobama.com/pdf/issues/HealthCareFullPlan.pdf>
10. James J. Shen, "Will China's healthcare reform save the day?" *Pharma China*, Issue 27 (November 2008), pp. 2-5.
11. OECD, "OECD Science, Technology and Industry Outlook 2008: Highlights" (2008), accessed December 22, 2008, <http://www.oecd.org/dataoecd/18/32/41551978.pdf>
12. PricewaterhouseCoopers "Pharma 2020: Virtual R&D – Which path will you take?" (June 2008)
13. For an extensive discussion of these trends, please see "Pharma 2020: Virtual R&D".
14. Lilly website, accessed December 8, 2008, <http://www.lilly.com/about/partnerships/>; and Debiopharm Group website, accessed December 8, 2008, <http://www.debiopharm.com/business-model.html>
15. PricewaterhouseCoopers, "Pharma 2020: Marketing the future – Which path will you take?" (February 2009)
16. University of Florida Health Science Center media release, "Walk this way: UF research provides insight into heart healthy exercise regimen" (November 14, 2005), <http://news.health.ufl.edu/news/story.aspx?ID=2846>
17. David Busch, "Can History Repeat Itself? The Case for the Virtual Medical Device OEM", *Medical Product Outsourcing* (December 2007), accessed February 21, 2008, <http://www.mpo-mag.com/articles/2007/11/can-history-repeat-itself>
18. Kenneth Eng, David C. Izard & Terek J. Peterson, "Managing the CRO Relationship to Effectively Request and Receive CDISC STDM and ADaM Deliverables", SAS PharmaSUG Proceedings (Atlanta, Georgia: June 1-4, 2008), accessed December 12, 2008, <http://www.lexjansen.com/pharmasug/2007/fc/fc06.pdf>
19. SRI International, "Capital and Time Efficiencies from Outsourcing Preclinical Development" (2005), accessed March 10, 2008, <http://www.sri.com/biosciences/pdf/OutsourcingPreclinicalDevelopment.pdf>
20. SR One website, accessed December 14, 2008, <http://www.srone.com/>
21. Lisa M. Jarvis, "Thinking Outside The Big Pharma Box", *Chemical & Engineering News* (May 7, 2007), accessed February 20, 2008, <http://pubs.acs.org/cen/coverstory/85/8519cover2.html>; and Associated Press, "Pfizer expands venture capital program" (August 1, 2007), accessed February 20, 2008, http://www.boston.com/business/articles/2007/08/01/pfizer_expands_venture_capital_program/
22. Jonathan Russell, "AstraZeneca spins off research", *The Telegraph* (February 15, 2008), accessed March 9, 2008, <http://www.telegraph.co.uk/money/main.jhtml?xml=/money/2008/02/15/cnastra115.xml>
23. Andrew Jack, "Goldman unveils plans for pharma research funding", *The Financial Times* (December 3, 2008), accessed December 12, 2008, http://www.ft.com/cms/s/0/e92f9d3c-c0db-11dd-b0a8-000077b07658.html?nclick_check=1
24. PricewaterhouseCoopers/National Venture Capital Association MoneyTree Report based on data from Thomson Financial.
25. The member companies of the Pharmaceutical Research and Manufacturers of America spent about US\$43 billion on R&D in 2006. Datamonitor estimates that discovery accounts for between 25% and 35% of these costs. For further information, see Pharmaceutical Research and Manufacturers of America (PhRMA), "R&D Spending by U.S. Biopharmaceutical Companies Reaches a Record \$55.2 Billion in 2006" (February 12, 2007), accessed February 20, 2008, [http://www.phrma.org/news_room/press_releases/r&d_spending_by_u.s._biopharmaceutical_companies_reaches_a_record_\\$55.2_billion_in_2006/](http://www.phrma.org/news_room/press_releases/r&d_spending_by_u.s._biopharmaceutical_companies_reaches_a_record_$55.2_billion_in_2006/); and Datamonitor, "Pharmaceutical Outsourcing Part 2: An Introduction to Drug Discovery Strategies" (August 2006).

26. Andrew Jack, "Drugmakers sweeten deals for biotech groups", *The Financial Times* (September 19 2008), accessed December 21, 2008, http://www.ft.com/cms/s/0/9d620a56-85d6-11dd-a1ac-0000779fd18c,dwp_uuid=aece9792-aa13-11da-96ea-0000779e2340.html
27. Jim Miller, "The Art of the Deal", *BioPharm International* (September 1, 2008), accessed December 10, 2008, <http://biopharminternational.findpharma.com/biopharm/GMPs%2FValidation/The-Art-of-the-Deal/ArticleStandard/Article/detail/545356>
28. Andrew Ross Sorkin & Stephanie Saul, "J&J buys Pfizer unit for \$16.6 billion", *International Herald Tribune* (June 26, 2006), accessed November 3, 2007, <http://www.ihf.com/articles/2006/06/26/business/pfizer.php>
29. Johnson & Johnson website, accessed December 11, 2008, www.jnj.com/connect/about-jnj
30. Johnson & Johnson press release, "Johnson & Johnson Establishes Wellness & Prevention Platform with Acquisition of HealthMedia, Inc." (October 27, 2008), accessed December 11, 2008, www.jnj.com/connect/news/corporate/20081027_151000
31. Sarah Rubenstein, "Novartis Spends Big on Diversification", *The Wall Street Journal Health Blog* (April 7, 2008), accessed December 21, 2008, <http://blogs.wsj.com/health/2008/04/07/novartis-spends-big-on-diversification/>
32. Reuters, "National Jewish Health and Roche Diagnostics Corporation Reach Agreement to Pursue Environmental Molecular Diagnostics Opportunities" (September 10, 2008), accessed December 11, 2008, <http://www.reuters.com/article/pressRelease/idUS134552+10-Sep-2008+PRN20080910>
33. Andrew Jack, "GSK chief pushes for expansion into new markets", *The Financial Times* (June 13, 2008), accessed December 21, 2008, http://www.ft.com/cms/s/0/617a6ef8-38e1-11dd-8aed-0000779fd2ac.html?nclink_check=1
34. PricewaterhouseCoopers, "Pharma 2020: The vision", pp. 24-25.
35. Robert S. Huckman & Eli P. Strick, "GlaxoSmithKline: Reorganizing Drug Discovery (B)", *Harvard Business Publishing* (May 17, 2005). Available for order at http://harvardbusinessonline.hbsp.harvard.edu/b01/en/common/item_detail.jhtml?id=605075
36. Milken Institute, "Financial innovations for Accelerating Medical Solutions", Vol. 2 (October 2006), accessed December 15, 2008, http://www.milkeninstitute.org/pdf/fin_innov_vol2.pdf
37. Aerotel Medical Systems media release, "Aerotel and Medtronic-Vodafone Launch Innovative Wireless Homecare System in Spain" (April 4, 2008), accessed December 8, 2008, <http://www.openpr.com/news/41301/Aerotel-and-Medtronic-Vodafone-Launch-Innovative-Wireless-Homecare-System-in-Spain.html>
38. Bigelow JH et al "Analysis of healthcare interventions that change patient trajectories", *The RAND Corporation*, 2005, pg xxvi
39. Audit Commission "A spoonful of sugar: Medicines management in NHS hospitals", December 2001, pg 19
40. For example, Giuffrida A and Torgerson DJ, "Should we pay the patient? Review of financial incentives to enhance patient compliance". *British Medical Journal* 1997 315: 703-707
41. Cathy Weselby, "Improving health at the office", *Silicon Valley/San Jose Business Journal*, accessed January 12, 2009, <http://sanjose.bizjournals.com/sanjose/stories/2009/01/12/story2.html>
42. Helen Loveless, "The comeback kid's medical cover", *Mail on Sunday* (October 29, 2007), accessed October 15, 2008, http://www.thisismoney.co.uk/insurance/health-insurance/article.html?in_article_id=425744&in_page_id=39
43. Based on the midmarket exchange rate of £1.00 to US\$1.48474 on December 22, 2008.
44. Audit Commission, "Health Data Briefing No. 12. Spending on disease: Diabetes" (September 2008), accessed December 15, 2008, http://www.audit-commission.gov.uk/Health/Downloads/HealthDataBriefing_spendingondiabetes.pdf
45. Total expenditure on pharmaceuticals and other medical non-durables expressed as a percentage of total healthcare expenditure ranges from 12.4% to 29.7% in the OECD countries. On average, it is thought to represent about 15% of the global health budget. For further information on healthcare expenditure in the OECD countries, see *OECD Health Data 2008* (October 2008).

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