

Drug discovery and VDDCs

Gary Lightfoot

The drug discovery industry may find that the way to succeed in today's competitive environment is to cooperate in strategic alliances with complementary organizations, such as contract research organizations, in the creation of virtual drug development corporations (VDDCs). VDDCs do business across traditional company boundaries through strategic alliances. When the strategic alliance is thoroughly defined and complementary core competencies are identified, a VDDC can achieve quicker product approvals and greater profits than are possible when a company attempts to manage the development process alone.

The passage of a drug from discovery to the marketplace is time-consuming and expensive, and traditionally has taken place under the auspices of a single corporation. However, the need to bring new products into an increasingly competitive and constantly expanding business arena inevitably conflicts with the current pressures to employ a smaller workforce and to navigate narrower windows of discovery-to-market opportunities. As Michael Schlander noted¹, "shorter effective patent lives" make it more critical than ever to get a new drug to market while there is still a profit advantage in having exclusive rights to the drug. To be truly competitive, a company must develop its products as fast as the newest

technologies allow. At the same time, however, drug development sponsor companies, as in most major industries, are now downsizing – slashing budgets, cutting full-time staff, relying on less expensive and less experienced part-time employees – in an effort to control spiraling costs, compensate for loss of capitalization and operate more efficiently overall.

The drug discovery industry may find that the way to do more with less faster is to emulate what companies in other cutting edge industries like semiconductor manufacturing and communications technology have done: learn to cooperate in strategic alliances with complementary organizations such as contract research organizations (CROs) in the creation of virtual drug development corporations (VDDCs). In the words of Jim Manji of Lotus Development Corporation, "The big opportunity for the rest of the decade is around companies transforming the way they do business across boundaries with partners and suppliers." Doing business across boundaries is what VDDCs are all about.

Vertical corporations have operational weaknesses

Traditionally, drug development is carried out within a 'vertically integrated' pharmaceutical corporation, typically with:

- permanent full-time staff,
- facilities for preclinical and clinical testing and development,
- equipment, space and manpower for manufacturing, and
- responsibilities for registration, distribution and sales.

This physical integration of people, property and processes creates enormous overheads, bureaucratic inefficiencies and the inability to introduce strategic changes without layoffs that can threaten corporate stability. The following examples from the biotechnology industry illustrate this reality: in 1992, Centocor discontinued Centoxin, and laid

Fools can learn from their own experience; the wise learn from the experience of others

Democritus (460–362 BC)

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off 700 employees (45%) within 1 year; Gensia stopped clinical development of Protara and had to cut 7% of its employees; and Synergen, a company whose rapidly rising stock indicated promising success, announced plans to abandon further clinical development of Antril on 18 July, 1994, and by the end of the day had slashed its workforce by half. By contrast, Biogen, an organization that utilized the concept of virtual clinical development for its drug Hirulog, experienced no layoffs when clinical development of the drug was discontinued on 31 October, 1994.

Although the fully integrated company maintains the capacity and control to oversee drugs from inception to sales, it still may not possess the specific skills or knowledge required to bring new drugs to market in time to realize maximum profit. Such a company may try to succeed with less than expert in-house guidance – a waste of time and money – or may hire outside experts, significantly increasing the costs of the development process. In addition, the barriers to information and communication brought about by specialization of function, coupled with the roadblocks of a multilayered management hierarchy, effectively create operational islands (Figure 1), preventing the smooth development of a product.

The VDDC has no such built-in weaknesses. Because it employs relatively few full-time key personnel, imports specialized expertise as needed, maintains minimal testing and administrative facilities and utilizes just-in-time resources, the VDDC decapitates overhead expenditures, circumvents hier-

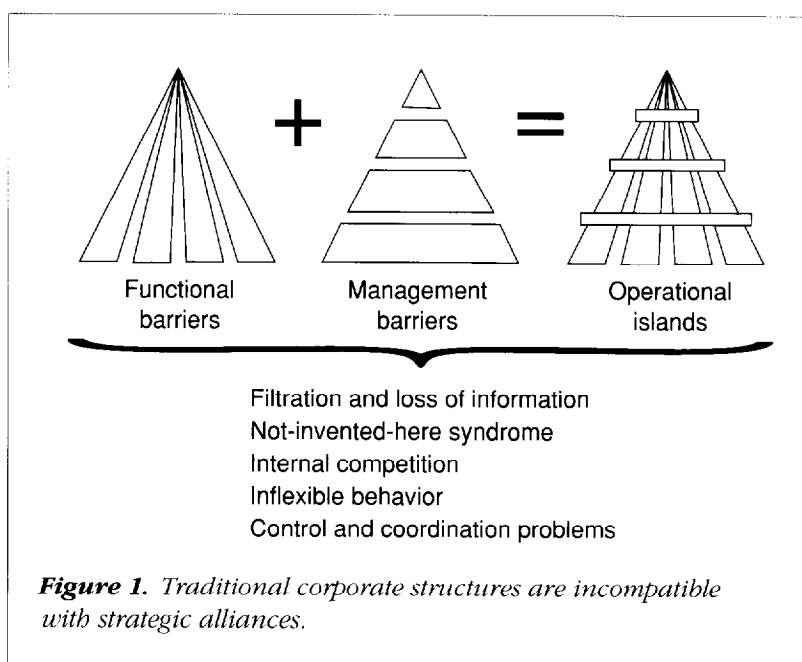
archical and bureaucratic obstacles, and ensures that the development of a new drug always receives the highest priority. As a result, the new drug is more quickly registered, is tested with greater efficiency and alacrity and is more reliably ready for marketing deadlines.

What is a VDDC?

A VDDC is analogous to a general construction contractor: the contractor coordinates procurement of permits, materials, labor and specialized skills; oversees construction and directs personnel; and measures progress with an eye towards meeting deadlines and containing costs. Specifically, the VDDC is a temporary, flexible network of expert resources that work together to streamline the drug development process. It can spearhead the development of several different drugs simultaneously, ultimately providing quicker product approvals and greater profits. The VDDC may consist of the company that discovered the drug, the company to which the drug is licensed, CROs and manufacturing, distribution and sales facilities.

One key difference between a general construction contractor and a VDDC is how success is defined. Judgement of the performance of a construction contractor is based on the successful completion of a building to a set of predetermined specifications within a budget and timeline. A VDDC should be judged on the basis of rapid and accurate evaluation of a drug's safety and efficacy. Since a high percentage of drugs fail to progress from Phase I to market, the VDDC should be rewarded both for 'failing fast' with an unmarketable drug and for reducing overall cycle time in the development of a successful drug.

Such an organization is referred to as a 'virtual corporation' because it seems "to be a single entity with vast capabilities but will really be the result of...collaborations assembled only when they're needed"². According to Jan Hopkins, the DEC executive who probably coined the term, "it describes an enterprise that can marshal more resources than it currently has on its own, using collaborations both inside and outside its business"². In drug development, the concept of the virtual corporation can be seen as an extension of the trend towards partner relationships between sponsor companies and CROs. No longer merely a project-by-project vendor, the CRO becomes a valuable ally, playing an integral part in the planning and development activities of the sponsor.



A drug development virtual corporation is an impermanent alliance of discrete companies that have the combined skills, expertise, experience and resources to focus on a single product, with the common goal of getting that product to market in time for maximum impact. The VDDC may exist only as long as it is effective, disbanding when the project is completed, or the VDDC may go into 'hibernation' until the next project is initiated. When companies work together as a VDDC, they gain significant knowledge that makes it easier for them to start a new project or return to work on new aspects of the previous project. Companies may find it beneficial to stay in contact during downtimes between projects, so that new projects can be initiated more rapidly. Each product will have unique needs, and the virtual corporation formed to develop it will be shaped with these requirements in mind. The VDDC is thus always tailored to the priorities of the sponsor:

- reducing cycle time (because getting the drug to market is the endgame),
- keeping error rates low, thereby making certain that the clinical results accurately represent the capabilities of the drug (preventing errors that would affect the ability to evaluate the drug or increase the cycle time for a study),
- providing specialized knowledge and skill not available in other companies, and
- eliminating unnecessary steps and activities to help control costs on the services provided.

Forming a strategic alliance means that the companies involved must collaborate on every level: operationally, by establishing communication links, systems links, joint SOPs, and joint databases; strategically, by sharing long-term goals; tactically, by agreeing on joint process improvement projects; culturally, by cementing clear communications and being aware of corporate or regional differences; and above all interpersonally, by using the best people available.

A good strategic alliance is created when both parties contribute value, when short- and long-term strategies are in lock-step, when skills are complementary, when investment flows both ways, when information and methods are shared, and when those involved behave with integrity and show mutual trust. In practical terms, the formation of such a partnership generally means moving from having numerous suppliers to a few, or only one. The previous relationship of buyer-seller is no longer adversarial but now must be collaborative, neces-

sitating an alteration in management style; instead of trying to get the best of one other, the companies now must get the most from each other. Protecting information yields to an open transfer of knowledge because the marketplace must now be viewed jointly rather than separately.

The risks of an expanded alliance are real: if one partner flags, the whole virtual entity suffers. Increased dependency on fewer sources means increased vulnerability should someone fail. Risk and reward are shared, however, and so each member of the new virtual corporation has a natural passion to help its fellow members succeed. The relationship between these companies becomes a very high priority, for it is this relationship that will ultimately get new drugs to market faster and more cheaply than one company could manage, and this result is the reward that makes the alliance worthwhile.

CROs play an important role in the VDDC

CROs are an integral part of the VDDC network. The CRO can serve as a vendor to work on overflow projects, to complete projects that are backlogged or to tie up loose ends. For example, a CRO may conduct one clinical study of the entire group of studies required, having little input into the overall design of the study or analysis of the data, or it may handle a drug from Phase 1 testing throughout the duration of the drug's clinical development, including gathering and analysis of all statistical data. Being involved in many individual studies for different companies has given CROs a wealth of experience and expertise. The CRO can quickly begin new projects because it already has standard processes for conducting many different types of studies. The VDDC approach takes advantage of this experience by employing CROs as full partners in new drug development projects; subsequently, the CRO can greatly enhance the probable success of a new project by participating in its long-term planning – from the design and analysis of clinical trials to guidance of the new drug through development and over regulatory hurdles.

CROs offer a variety of services, including toxicological and other preclinical studies, protocol design, Phase I to Phase IV clinical trials, statistical and clinical analysis of data, medical writing, and regulatory and clinical consulting, although very few CROs provide all of these services. In fact, some CROs may not provide all the services a particular VDDC requires; some may specialize in particular therapeutic fields and not others; certainly very few CROs are competitive in the global market. Likewise, not all CROs have compatible capabilities for data analysis and transfer, shared databases, video

conferencing, and other new technologies that are essential for sharing and preserving the integrity of information across the virtual space of a VDDC. Where circumstances dictate, a VDDC can augment its resources by forming partnerships with the CROs that fit their long-term strategic needs, ensuring that development projects can run simultaneously and that different areas of expertise are included.

Not business as usual

The success of a VDDC hinges on two things. First, current technology, which makes the VDDC possible in the first place, and second, current people – employees and managers who are willing and able to think about their roles in a new way.

Because of modern communications technology, “the virtual corporation is now feasible”³. People from different companies in different places can collaborate easily now; through innovations in telephone service, video conferencing, electronic mail, fax and overnight delivery, communications can be sent or received at any hour on any day. This fact alone increases efficiency and hastens the work day by eliminating time wasted waiting for information. Furthermore, the integrity of information is truer because information transfer is immediate and direct. More specific to the pharmaceutical industry, technology has also made the actual process of drug development much more rapid and accurate, with automated systems for everything from biostatistical analysis to computer-assisted new drug approvals (CANDAs). And these systems can easily be shared among collaborating companies through technology such as computer networking.

Ultimately, however, it is the people in an organization that determine its chances for success; this is nowhere more true than in a VDDC. In a typical corporation, employees often feel apathetic with regard to high levels of performance because the corporate culture dampens the enthusiasm to excel. Few employees share directly in the tangible rewards of corporate success, and incentives to become personally involved to the fullest are simply absent. Furthermore, in the vertical corporation, levels of management, particularly when paired with functional barriers, are more often obstacles to timely progress rather than helpful checkpoints (Figure 1). In the case of the virtual corporation, “Hierarchical and directive management will turn into a management fiasco for the virtual corporation...Levels of management mean levels of approval, and levels of approval take time...Time is the virtual corporation’s most valuable resource and the one commodity it cannot afford to waste”⁴.

The VDDC, by its very nature, involves employees personally. Every person who is working to develop the new drug is responsible not only for his or her role, but for the eventual success of the entire project. It is not a single person or department that stands to gain or lose; the existence of the VDDC itself actually depends on the prompt and complete attention of the individual participant. Likewise rewards should correspondingly accrue in the form of recognition, increased pay for the project’s completion, or opportunities to participate at even higher levels of responsibility in future projects. The close relationships between employees of collaborating companies that have formed a virtual corporation require a new style of management, one that is based on more shared control and responsibility for the drug development process. Managers will “have to build relationships, negotiate ‘win-win’ deals, find the right partners with compatible goals and values, and provide...the right balance of freedom and control”⁵. Because the virtual corporation is essentially a flat structure, each member, regardless of rank in his or her own company, must be able to keep the common goal of getting the new drug to market his or her foremost and constant priority. It’s not impossible, but neither is it business as usual.

Taking advantage of core competencies

The key factor in putting together a potentially successful VDDC is that each company involved must do what it does best. Before entering into an alliance, a company must analyze and identify its intrinsic strengths – the ‘core competencies’ of the company. James Brian Quinn and Frederick G. Hilmer define core competencies as “specific skills the company has or must have to create unique value for customers. They provide the firm’s uniqueness, competitive edge, and basis for value creation for the future”⁶. Figure 2 illustrates a framework for determining core competencies. A company’s true core competencies have high durability and higher differentiation from those of competitors, and they would also have high market impact. For example, a CRO may excel in clinical testing, data analysis, or medical writing; whereas the strongest contributions of a pharmaceutical company may be in the area of drug discovery or market access. Core competencies are an organization’s crown jewels, the characteristics about it that are unique, the things a company must identify, treasure and develop.

Key skills, on the other hand, can be complemented and supplemented through strategic alliances. For instance, a particular CRO might have experience and expertise in an area in which its partners lack expertise, and can hence perform

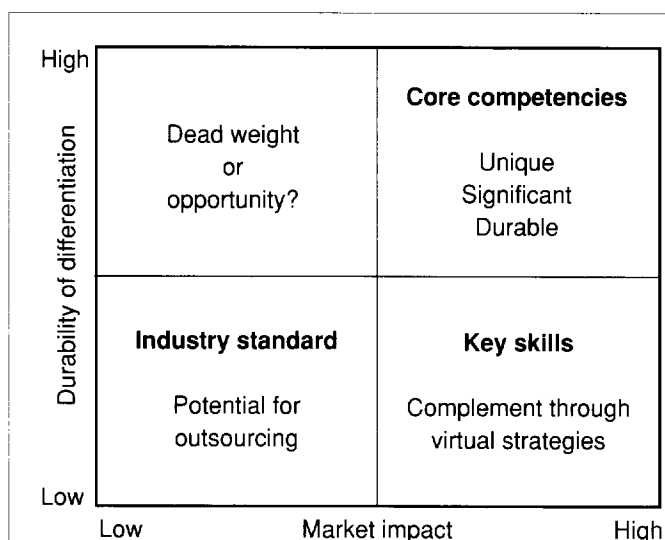


Figure 2. Core competencies must be sustained and developed internally.

an irreplaceable service to the entire VDDC. Additionally, those things that are industry standard – data management, for example – have obvious potential for outsourcing. A partner in a VDDC could turn a combination of data management and software development into a key skill that gives the whole VDDC a real competitive advantage.

Having identified the core competencies that make its partnerships valuable, the virtually integrated pharmaceutical group can realize a number of business options (Figure 3). It can initiate contract manufacturing. It can engage marketing partners for promotion, advertising and sales. In the area of discovery, the VDDC may have an outreach program that draws on biopharmaceutical groups and university research in addition to its own in-house efforts. The financial wing of the strategic alliance would focus on providing administrative support at the appropriate times to help get things done. The outward tendencies of the virtually integrated pharmaceutical group make it more open to

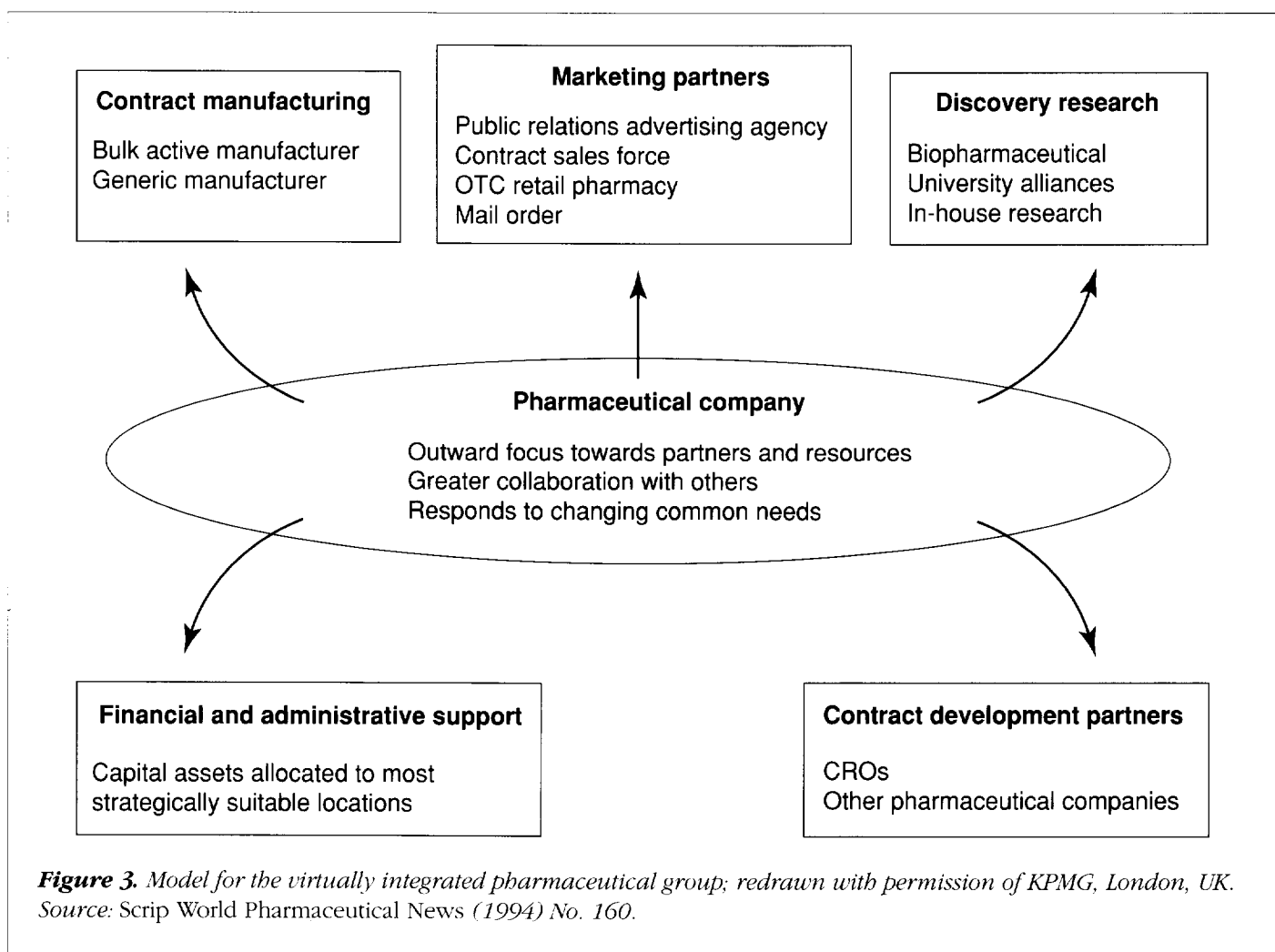


Figure 3. Model for the virtually integrated pharmaceutical group; redrawn with permission of KPMG, London, UK. Source: Scrip World Pharmaceutical News (1994) No. 160.

opportunities to form partnerships with CROs and other pharmaceuticals.

An example of a working strategic alliance is the recent partnership formed between Telos Bioinformatics, a Swiss software design firm, and Pharmaco International, a CRO. Called Trimaran™, after the swift, three-hulled sailboat, this alliance is working to build special applications that will streamline the research process and facilitate the flow of information through computerization. Both companies perceived an advanced market for the specialized software solutions created for Pharmaco – graphical interfaces that keep track of patient information – and now these companies are working together to increase speed and stability in the data management process.

The focus of this new business is the development of software related to the management of clinical research studies, the rapid retrieval of 'clean' clinical data, and computerized training materials to help this process flow smoothly. Trimaran consists of three parts: the first incorporates Pharmaco's Research Trials Management System (RTMS™), an Oracle database system developed and used over the past five years to manage clinical studies; the second is a computerized remote data system that can be used at an investigator's site to enter clinical data and electronically transmit those data to a central location with a graphic interface to display patient and study status; and the third is a series of computerized training and reference programs that provide instant access to standard operating procedures (SOPs), good clinical practices (GCPs), and infor-

mation related to individual study protocols and therapeutic categories.

Such alliances work because cross-contact inspires ideas, and ideas are what drive successful business.

The future is virtually here

According to Joel Bleeke and David Ernst, the number of alliances on the virtual corporation model has grown more than 25% annually in the past five years⁷.

With a median life span of seven years⁷, virtual corporations are becoming the source of an astonishing increase in profitable business. The same success is foreseeable in the future of the drug discovery industry; the resources required to realize this success already exist, and companies are now looking for opportunities to form the types of alliance that promote accelerated, cost-effective discovery-to-market drug development. In the words of Lester Thurow, "A competitive world has two possibilities for you. You can lose. Or, if you want to win, you can change"⁸. Cf. Democritus.

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