

# Realizing Value from Knowledge Management: An Assessment of Opportunities for Alpha Pharmaceuticals

## Executive Summary

For the past several years, working with clients in the pharmaceutical industry, Cambridge Technology Partners has developed a unique perspective on the tangible economic value of knowledge. Using insights acquired from client engagements and accepted financial principals we have developed a methodology that clearly substantiates the linkage between knowledge management, rapid innovation, and measurable economic value.

Based on preliminary analysis, we believe that Alpha Pharmaceuticals has a significant opportunity to realize measurable economic value through the targeted application of knowledge management. Our assessment indicates that within two years Alpha could expect to see as much as a 16% increase in market capitalization through the adoption of practical knowledge management techniques, incentives and information systems.

This white paper sets forth our reasoning and outlines what we believe the potential magnitude of this opportunity to be for Alpha Pharmaceuticals.

## Our View on Knowledge Management Solutions

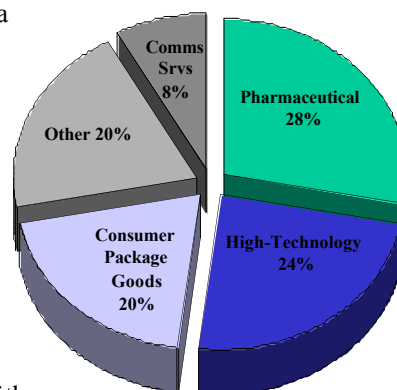
Today, there are numerous, sometimes conflicting definitions of Knowledge Management Solutions. Our unique approach relies on the ability to create economic value as the necessary basic driver behind all enterprise activities. Creating value comes from the efficient and innovative use of corporate resources, both tangible and intangible. It is the better management of the intangible knowledge resources within a company, including best practices, customer and product knowledge, information flows, values, behaviours, and teamwork, which will significantly increase the ability of an enterprise to out-perform its competitors, and increase its overall value for the stakeholders. Finally, this effect is magnified in innovation intensive industries like pharmaceuticals. The basic tenet behind our focus on Knowledge Management Solutions is the creation of real economic value.

## Knowledge Management and Economic Value

Recently, there has been growing acceptance on the part of industry and financial analysts of the concept of market-to-book value as an indicator of intellectual capital. Significant premiums in market valuation over and above accounting book value are deemed to be a reflection of how well a firm manages intangible assets including knowledge. For instance, Microsoft enjoys a market value of about \$340B, while its book value is approximately \$12B. The difference, or about \$328B, is considered an intangible asset attributable to Microsoft's intellectual capital which it achieves through the management of knowledge.

One of the generally accepted ways that this market-to-book premium has been expressed is as an indicator developed by Stern, Stewart & Company that is called Market Value Added. Simply put, Market Value Added (MVA) is the difference between the market valuation of the firm (share price x shares outstanding)

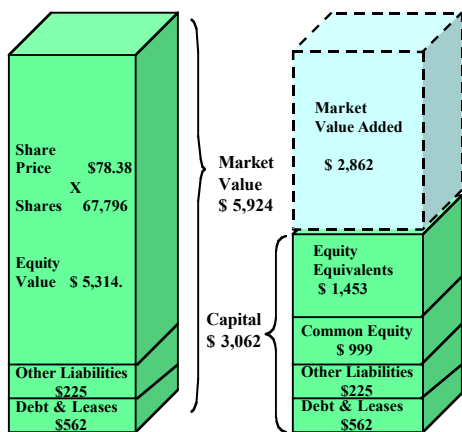
and the economic capital employed by the firm, or the sum of its financial obligations including shareholder investments, leases and long term debt. Below is an example of MVA for Warner Lambert, FY 1988.



*Top 25 Market Value Added Firms by Industry - Stern, Stewart  
1997 MVA Ranking*

The precise calculation of MVA requires the restatement of certain P & L and Balance Sheet items. However, based on this example, Warner Lambert at the end of 1988 had an MVA of \$2,862M. Similar calculations can be made for most publicly traded firms and in fact Stern Stewart publishes these figures for the largest publicly traded firms on an annual basis. Interestingly enough, for the year ended 1997,

the last for which figures are available, pharmaceutical firms represented a significant portion of the top 25 firms with respect to the creation of MVA (see above).



Warner Lambert: Market Value Added  
Source: "The Quest For Value", G. Bennett

A number of other economic measurements are useful when assessing how knowledge management contributes to the creation of economic value. Within the pharmaceutical industry we examine several factors including Working Capital Turns, Calculated Intangible Value, Information Productivity and Economic Value Added. Each of these factors provides a different perspective into how effective a given firm is with respect to creating value through knowledge management.

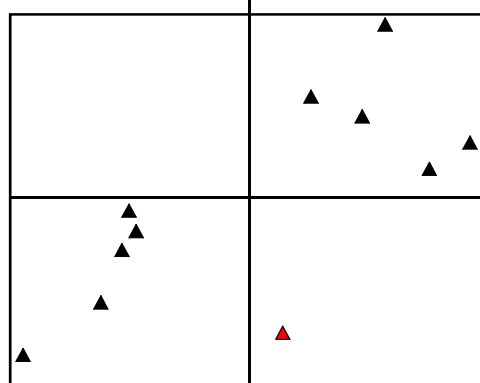
If we assume that MVA is an accurate reflection of valuation of the intellectual capital produced by the enterprise, and that the knowledge supplied by people is the primary means for producing this capital, then MVA per employee can be used as an accurate measure of the relative performance of knowledge within the

firm. Using 1997 data as a basis of comparison we can see how Alpha has performed relative to other pharmaceutical companies in the creation of intellectual capital or MVA as a function of the number of people employed by each firm.

Based on this assessment, Alpha has achieved slightly better than average MVA/employee. However, this achievement is not reflected in the firm's overall market valuation for 1997, which was significantly below industry average. This may have been the result of a number of different circumstances. It could reflect the way in which economic capital has been deployed within the

business. If a disproportionate share of capital was invested in plant and equipment it may not have an immediate impact on market value. However, the lower than average market to economic capital ratio may also be a reflection of the way in which Alpha employs capital to convert R & D into commercial products. This last factor is indicative of the sustained rate of innovation that determines the rate at which new revenues are created. Our research indicates that it is this ability to rejuvenate revenue through new product introduction that is the primary driver in the creation of MVA in the pharmaceutical industry.

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## Innovation and Value Creation

A number of factors can have an impact on MVA. Some of these factors can be directly controlled by the firm while other factors can not. In order to determine how MVA is directly influenced by internal factors we have examined the impact on MVA from a number of operational factors that can be controlled by each firm. By comparing changes in operational factors to changes in MVA we have developed an understanding of which factors have the strongest influence in enhancing MVA. What we have found is that in most instances MVA for pharmaceutical companies is strongly linked to their ability to rejuvenate revenue through the introduction of new products. This in turn is a direct reflection of each firm's ability to rapidly invent and commercialize new products. In most instances, new product development is a function of a firm's ability to exploit both its technical knowledge as well as its process expertise, factors that are clearly related to the firm's ability to create, share and manage knowledge.

Working with available industry data we have determined that the MVA for pharmaceutical firms has a direct correlation to the rate at which revenues

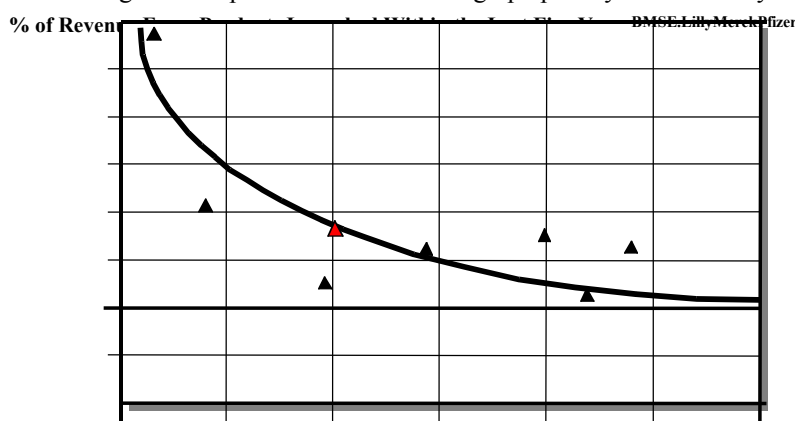
	%Revenues from Products < 5 years old	MVA/Employee
Shering-Plough	43.9%	\$1,813K
Merck	42.0%	1,007

can be rejuvenated through the introduction of new products. For these purposes we considered revenue from products that were five years old or younger to be new revenue. We employed a five-year threshold based on expected product life cycles and rates of competition and substitution experienced by the industry. In general, pharmaceuticals that derive a higher percentage of revenues from products that are five years old or younger have higher MVA/Employee.

Similarly, revenue rejuvenation is strongly linked to the ability of these firms to invent, patent and commercialize new products. By examining the relationship of these operational activities to the rejuvenation of revenues we have developed a method that predicts the impact or elasticity on MVA/Employee from an increase in the rate of innovation and commercialization of new products. This formula predicts that a 1% change in the amount of revenue derived from new products would produce the following change in MVA/employee for each of the above firms given their existing percentage of new revenues.

	<i>MVA Increase Potential Per Employee</i>
<b>Bristol-Myers Squibb</b>	MVA increase of 4.1%
<b>Pfizer</b>	MVA increase of 3.4%
<b>Schering-Plough</b>	MVA increase of 3.2%
<b>Merck</b>	MVA increase of 2.2%

Using available 1997 data for pharmaceutical companies, we plotted the predicted change in MVA from a 1% change in new product revenues. The graph portrays the elasticity that exists between



MVA/employee and changes in new product revenue by plotting the expected increase in MVA/employee due to a 1% increase in new product revenue on the Y axis and the existing percentage of new product revenue on the X axis. As you can see, the potential increase in MVA/Employee diminishes as the existing percentage of new product revenues increases. Consequently, the opportunity for firms like Merck and Schering-Plough

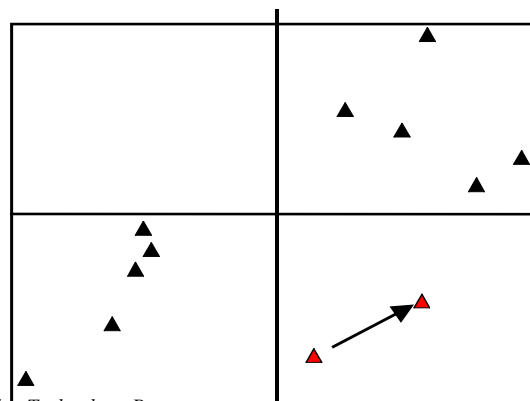
to experience increases in MVA/Employee is substantially less than it might be for firms such as Pharma & Upjohn and Bristol Myers Squibb.

Based on this analysis, Alpha has the potential to increase its MVA per employee by roughly 3.5% by increasing new product revenue by 1%. Using the 1997 data that we were able to obtain, a 1% increase in new product revenue would increase Alpha's MVA/Employee from \$1449K to \$1499K or increasing total MVA from \$81.3B to \$84.2B (see below). This would translate to an increase in market capitalization of just slightly less than 2.0%. Since it is unlikely that the introduction of new products would have only a 1% increase in new revenues this understates the potential available from accelerating innovation. A more likely scenario would suggest that the potential increase in revenue contribution from new product introduction in any given year would be closer to a 10% change rather than a 1% change. Assuming this were the case then the increase in MVA/Employee would be closer to \$1869K and total MVA would approach \$105.2B representing an increase in overall market capitalization of approximately 16.0%.

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## Innovation and Knowledge Management

Knowledge management as a disciplined means of exploiting experience and expertise is credited by numerous Fortune 500 firms as the single most critical capability when it comes to sustained rates of



innovation. This stems from many factors including the ability to spark conceptualization and creativity, synthesize concepts between disciplines, retain and transfer experience between groups, and identify high potential opportunities. This is especially true when the primary value orientation of the firm is the creation and commercialization of new products.

Several times during a recent workshop it was mentioned that the primary value to be derived from KM by Alpha would be continuous improvements in key business processes including AST and FACT. Several individuals mentioned that a large part of this value could be derived by passing proven techniques between teams that enter and exit the AST and FACT processes. Since most AST and FACT team members are new to the process, they reinvent it each time they pass through, revisiting mistakes and dead ends along the way, wasting as much as a year in the bargain.

We believe that increasing the efficiency and innovation within the AST and FACT processes with focused Knowledge Management solutions represent only a fraction of the potential value that knowledge management represents to Alpha. Other opportunities include better project selection and prioritization, closer collaboration during development, new insights from primary research and derived data, faster commercialization, and longer product life cycles.

## **Summary and Conclusions**

Based on our preliminary assessment we believe that Alpha, along with its shareholders, customers and employees, has the potential to realize significant economic value from instituting practical knowledge management solutions. We believe that the available potential opportunity could represent an increase in market capitalization of approximately 16% realizable within two years. Consistent with the magnitude of these projected results would be commensurate increases in retained earnings, residual income and market share. Furthermore, we believe that this is a conservative estimate of the potential value available from these types of initiatives.

As an obvious next step, we recommend that Alpha initiate a detailed analysis of these opportunities using current financial and operational data. The purpose of this analysis would be to confirm the magnitude of these projections, identify critical success factors and risk factors that might inhibit or enhance the realization of measurable economic benefits from instituting knowledge management initiatives. Following steps would identify the solutions best able to affect the overall ability for Alpha to produce measurable value, and then create appropriate plans to execute and finally realize that value.

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