Chapter 3: Strategy & Intellectual Capital

"He's invented a saltshaker that will never clog."

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Summary

The purpose of this chapter is to help you understand what knowledge assets are and their importance within the business environment of a knowledge-based economy. Discussion of intellectual capital (IC) within an organization provides a framework and context for how knowledge assets fit within the organization. From this chapter you should understand that different forms of protection apply to different circumstances. This foundation will provide a background surrounding the ownership issues of different types of intellectual capital, and identify the risks and benefits associated with each type of protection.

The following subjects will be covered in this chapter:

- what is intellectual capital?
- formal (intellectual property) and informal intellectual capital systems
- the process of managing intellectual capital
- the value of research and development systems
- the value of contract management systems
- the value of human capital management systems
- the value of knowledge access systems

Resources 🕮

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Balance Scorecard Collaborative www.bscol.com

Strategy & Intellectual Capital

Earlier we established the general importance of knowledge within organizations. “Knowledge firms” are often valued more highly in the marketplace than one would expect from considering the break up value of the firm. For example, the market value of a company such as Microsoft is justified more by analysis of its intangible intellectual asset portfolio, comprising its brand market share, secret and copyrighted source code, among others. Their market value is then a reflection of the public's perception of company's ability to convert all of their assets into revenues. The market premium paid for knowledge companies can be attributed to the way in which these firms exploit their intellectual capital.

One definition of intellectual capital includes the sum of a firm’s ideas, inventions, technologies, brands, general knowledge, computer programs, designs, data skills, processes, creativity and publications—in short, knowledge that can be converted into profits.

Several intellectual capital models have been advanced. For companies that focus on extracting value from their intellectual capital, the model could include the following elements:

1. *Human capital* is the human side of the enterprise. Human capital focuses on the knowledge and know-how captured by individuals or groups within an organization. Companies that develop human capital well, do well in managing people and knowledge-intensive activities. Values are key components in understanding human capital.
2. *Customer capital* is where some intellectual capital models include the value and importance of customers and customer relationships. These relationships contribute to the image or reputation of a company.
3. *Stakeholder capital* is broader than customer capital. This kind of capital includes other stakeholders in the organization, such as vendors, suppliers, and stockholders, as well as customers.
4. *Cultural capital* refers to the internal organizational environment, including communication issues with individuals and groups, and values and vision.
5. *Relationship capital* is the value or potential value of different capitals in interaction with each other.
6. *Spiritual capital* encompasses the essence or positive spirit of the organization. It is difficult to link spiritual capital to the extraction of value in intellectual capital.
7. *Organizational capital* refers to how an organization and its people are set up to best take advantage of market conditions.
8. *Structural capital* includes the hard assets and structures that make up an organization, i.e., the assets, buildings, machines, etc.
9. *Process capital* includes the training and other organization processes that control the flow of information.
10. *Economic capital (this is also called financial capital)* is the intersection of the organization (human and structural capital) with the needs of customers and stakeholders to generate value.

Knowledge Management & Intellectual Asset Management

Recall the views of I. Nonaka on knowledge management which we discussed in Chapter 1. The three actions of knowledge organizations are captured by knowledge creation, knowledge dissemination and knowledge integration with products and services. We have added a fourth key action - knowledge ownership & control.

Action 1 - Knowledge Creation

There are many things that firms do to achieve breakthrough innovation and to achieve continuous improvements to existing innovation. None are more important that those things firms do to motivate and support their people. Some of these are:

- Stock option programs for executives and employees
- Incentive programs for creation
- Benefit programs
- Flexible and comfortable work environments
- Professional challenge
- Compensation

Examples of Incentives

Motorola corporate incentive

- $1,000 for each patent filing
- more for an issued patent

3M corporate incentive

- internal training programs
- employee transfer programs

Action 2 - Knowledge Dissemination

An essential element of any management system is the delivery of knowledge to those who need it when they need it, which is to a large extent implemented in most firms through their information technology infrastructure. The larger an organization the more important this becomes. Later in this course when we discuss ways of extracting value in more detail there will be a discussion of performance metrics that apply to the assessment of information technology systems. Many organizations that have established large information technology infrastructures are now finding that these systems are not delivering the performance improvements they had originally expected. To a large extent this may be attributed to an inadequate, or in many cases the lack of, a well-developed knowledge management process.

Information technology is like any other technology when considered from the perspective of intellectual capital. Information technology is most often protected by a combination of copyright and trade secrets. It is becoming more common to protect software with patents where appropriate. It is most often licensed to the end user and agreements between complementary firms owning complementary software will often engage in various forms of licensing and strategic alliance development where the cost of technology is shared.

Whether you develop your own information infrastructure or whether you get it from somewhere else, your IT system forms a key component of any knowledge management / intellectual capital management system. Wherever possible, companies need delivery of knowledge to those who need it when they need it.

Action 3 - Knowledge Integration with Products & Services

Studies done by Statistics Canada indicate that half of large firms and a third of small firms report sales from a major product innovation within the last three years. Only 25% of these firms use any type of IP protection (only 7% use patents). While 80% of large firms say they manage their IP, less than 20% of small firms say the same. Although the larger firms do have more money to manage larger portfolios of intellectual capital one must realize that most large firms at one time were small. It is one common thread among larger knowledge based firms that the strategic management of knowledge clearly helped most of these firms achieve the competitive advantage that supported their growth over time.

Later in this course we will explore the process of new product development and the impact of innovation on firms.

Action 4 - Knowledge Ownership & Control (Intellectual Asset Management)

Various types of contracts are used in the development and management of an intellectual capital portfolio. Employee contracts, agreements with alliance partners, various forms of brand and technology licensing and various forms of technology development and maintenance agreements are examples of several forms of contracts which require close attention in a knowledge based organization. Here we consider only the first of these, employee agreements, which are essential, often taken for granted and often become the source of significant disputes when poorly handled.

Ownership of IP differs in Canada and the US. Employees in both countries give up IP rights to the companies they work for. Contract employees in the US also give up their IP rights. In Canada, however, contract employees retain the rights to what they create *unless otherwise stated in their contracts***.** Canada does not have the doctrine of "work for hire" in law that exists in the USA. In Canadian law an inventor owns his/her own creations. However, disputes can arise with employees on the nature of work they were performing and on the issue of whether they were "hired to invent". A contract employee seems to have the same status as a permanent employee if the company pays the contract worker's health benefits. For employees or contractors it is a best practice to clarify this issue in the contract for employment or contract for specific services, as the case may be. Often lack of attention to this detail has prevented firms from establishing clear title to their development efforts, and in some cases this has resulted in greatly reducing the value of the firm as a whole.

Intellectual Asset Management - Vision & Performance Measurement

It was once said "what you can't measure, you can't manage." One form of intellectual capital management structure has helped over half of the global 1000 firms to better integrate business strategy with shop floor practice is worth special note. The "balanced scorecard" developed by Dr. Robert Kaplan (Harvard University) and Dr. David Norton through the 1990's forms a substantial portion of Harvard's current thinking on performance measurement. Heralded as one of the best management techniques to ever come out of Harvard University, the balanced scorecard helps firms to better understand intellectual capital and to better apply this understanding to day-to-day operations.

Information age organizations must face a new set of operating assumptions that were not fundamental in the industrial age. Cross functional teams now combine the benefits of specialized functional knowledge with speed, efficiency and quality of integrated business processes. Direct links to customers and suppliers

have substantially changed today's approach to the value chain from one that pushes products and services to the end user to one that reacts directly to customer demand. Enormous improvements in cost, quality and response times are possible. Customer segmentation is no longer addressed by offering a small number of standardized options for customers. Rather customers are demanding more and more personal customized choice and getting it. Driven by reductions in trade barriers and elimination of regulated operating environments, firms must now compete with the best in the world not just the best in their neighborhood. Innovation rates continue to accelerate and drive down cycle times. Such continuous improvements to product capabilities and business processes are essential for long-term success. Finally, knowledge workers are driving change in their organizations as they try to transform themselves to compete in the new environment.

Knowledge workers are the key to improvement initiatives such as total quality management (TQM), just-in-time (JIT) production and distribution systems, time-based competition, lean production, building customer-focused organizations, activity-based cost management, employee empowerment, and reengineering. These improvement programs all have their successes however in general they have produced disappointing results in particular when they are not linked directly to the organizations strategy with specific performance requirements.

The balanced scorecard provides a framework to translate strategy into operational terms. A scorecard has 5 components.

- First is strategy and vision, which must be clearly defined and understood by everyone in an organization.

Complementing strategy and vision are four views of the organization:

- The financial view asks the question: "To succeed financially, how do we appear to our shareholders?"
- The customer view asks the question: "To achieve our vision, how should we appear to our customers?"
- The learning and growth view asks the question: "To achieve our vision, how will we sustain our ability to change and improve?"
- The internal business process view asks the question: "To satisfy our shareholders and customers, what business processes must we excel at?"

For each of the four views of the organization the scorecard requires an organization to set clear objectives, measures, targets and initiatives. The scorecard acts as a cornerstone to all forms of communications in an organization - to customers, to investors, to employees and to other stakeholders. The ability of management to bridge strategic objectives with operational performance is fundamental to their ability to maximize value that it can extract from the resources it has at it's disposal. Intellectual resources more than structural resources, provide strategic tools for establishing competitive advantage. Performance scorecards provide an excellent vehicle for organizations to shift their focus from a traditional structural orientation to an intellectual asset orientation.

Skandia, a Swedish financial services firm, started a trend in the early 1990's to report annually to their stakeholders (the Skandia Navigator) on the growth and direction of their strategic intellectual assets. In order to do so they have made themselves develop clear understanding of all four areas of the scorecard model discussed above and use the result very effectively as a core communications tool to maximize value for all stakeholders.

Formal v Informal Forms of Intellectual Capital

Each type of intellectual capital has a different application and form of protection. Each one provides a different business tool with which a firm may use to implement strategy. Each type of intellectual capital offers an organization or person different related risks and opportunities. Here we define formal forms of ownership, such as patents, to be based on some form of legislation (the patent act) and informal forms of ownership, such as trade secrets, to be based on agreements and related contracts of one sort or another where there is no common legislated foundation.

Some forms of creative endeavor are easier to protect and control than others. Intellectual property is the portion of a firm's intellectual assets that can be legally protected through national legislation and international treaty. Commonly included in IP are patents, copyrights, industrial designs, integrated circuit topographies, plant breeder's rights and trademarks. Intellectual assets that are not protected by formal legislation but are provided domestic and international value include know-how and trade secrets. These kinds of IP are often protected through contracts and related domestic and international trade laws.

Companies who innovate and manage their intellectual capital well, gain various competitive advantages over their competition which leverage their ability to sell more products and services to customers, increase internal process productivity, increase their ability to learn and grow as an organization, and improve their ability to raise capital and communicate with investors.

Build A Process for Managing Intellectual Assets (Control & Ownership)

Based on Dow Chemical's approach for managing intellectual assets we provide the following six-step process:

1. Begin with strategy—define the role of knowledge in each business or business unit;

   (IP Management Process Teams & IP Facilitator)

2. Assess competitor's strategies and portfolios;

   (Patent Mapping)

3. Classify your portfolio—what do you have; what do you use; and who in the business should be responsible for it;

   (Technology Engine Process)

4. Evaluate the cost and value of your IP assets and decide whether to keep, sell or abandon them;

   (Technology Engine Process)

5. Invest—based on what you learned about your knowledge assets;

   (Licensing, Joint Venture & Alliance Processes)

6. Identify gaps you might fill to exploit knowledge or holes you should plug to fend off rivals and either direct R & D efforts there or look for external technology to acquire.[1]

[1] Thomas A. Stewart, *Intellectual Capital* (Toronto: Doubleday Dell Publishing Group, 1997), p. 62.

The intellectual capital management approach of the Eastman Chemical Company is outlined in detail in a case study provided at the end of this Chapter. The following is an overview of an intellectual asset management process that can greatly help any firm to maximize the value of it's knowledge portfolio. This process fills the need a firm has to systematically control and own knowledge.

Step 1 - Begin with Strategy

For any knowledge based firm, intellectual capital management sits at the root of strategy development. For any strategy to succeed in creating value an organization must have executive level commitment. Executive decision-makers who learn to understand management of intellectual capital will lead their firms to long term sustainable competitive advantage. The place for any firm to start is to define "knowledge" within the organization so that it is clear to all involved what the process is trying to manage.

Step 2 - Audit the Firm's Knowledge Portfolio

Dow Chemical provides an interesting case of IP management in a large organization. In particular, the results of their core - non core technology ownership audit resulted in some very interesting findings which has lead to many out licensing opportunities.

> Dow Chemical Corp. moved from central record keeping of its intellectual property to an active management role in 1993. Within the patent portfolio, business opportunities and the potential for additional licensing revenue that may be available were assessed. It was found that Dow exploited less than half its patents. Many fell outside the bounds of existing business units—thus no area had the responsibility for commercializing or licensing them. Assessing the unattended IP at Dow realized the following returns:
>
> 1. A saving of about $50 million in tax, filing and other maintenance costs.
> 2. An increase in revenue from licensing patents from $25 million in 1994 to a forecasted $125 million by 2000.

This example indicates the clear value of IP ownership and control, and the need for organizations to track what they have and how they use it and share it.

Step 3 - Assess Complimentors & Competitors

For the development of strong strategies a company must dedicate time and resources to the effort of competitive intelligence. Later chapters will expand on the field of competitive intelligence and in particular focus on the analysis of intellectual capital portfolios.

Complimentor organizations are those who are not competing but have some form of strategic alignment with the company such as a supplier relationship, or perhaps a company using similar technology but in another field of use. An example of three complimentary firms might include Microsoft, Intel and Compaq. One makes software, another makes PC's and the third makes components for PC's. They do not compete directly but all maintain strategic relationships so that they can fully manage the entire value chain.

Competitors include those firms who are selling the same products or services to the same markets, but from a technology ownership perspective, should also consider firms who sell into different markets or who use similar technology in different fields of use. These types of firms can easily be competing to develop similar technologies.

Step 4 - Evaluate Cost Benefit of Activities

Evaluation of cost benefit must estimate the future value of outputs. Four types of activities are often associated with intellectual capital management and contribute toward improved performance of the intellectual capital management process.

- Research and development activities (i.e. Ownership outputs)
- Contracting activities (i.e. Alliance, License)
- Human capital activities (i.e. Employee Incentives)
- Information technology activities (i.e. Knowledge access)

Step 5 - Invest Strategically for Sustainable Competitive Advantage

Knowledge may be acquired in two ways. It may be created internally or it may be purchased or rented from an external source. It is important internally to establish new product development management systems that strategically support internal and external development of technologies that will provide long-term sustainable competitive advantage.

Investing 8 % of sales back into the new product development cycle (internally and externally) is a good rule of thumb. It is based on an average investment in innovation made by firms across all industry sectors. For specific industries one should study specific trends in that industry.

Step 6 - Continuous Improvement of Knowledge as an Asset

Knowledge management is a repetitive process that requires ongoing refinement and assessment. The fundamental common thread throughout the process is the treatment of knowledge as a key asset of the company despite the failings of traditional accounting systems to provide meaningful management feedback. In later Chapters there will be much more discussion of the valuation of technology and related performance measurement that should be incorporated into the process.

Conclusion

Intellectual asset management is a very important aspect of knowledge management within any organization. Intellectual asset management provides a means for an organization to better extract value from the knowledge of people inside and outside of the organization. Knowledge can be exploited in a variety of ways, so having a clear understanding of formal intellectual property systems and a clear understanding of informal intellectual capital systems is an essential factor when developing and implementing business strategy.

Establishing processes and measurement systems to support the development of intellectual capital within an organization is crucial to success in today's global competitive environment. The creation of new knowledge, the dissemination of knowledge, the integration of knowledge within products and services, and ownership and control of knowledge form the four cornerstones of competitive advantage for knowledge based firms. The ability to best extract value and establish sustainable competitive advantage from knowledge is the domain of the fourth cornerstone, ownership and control of knowledge or intellectual capital management.

Case Study: Eastman Chemical's Intellectual Capital Approach

(Original Title: "Intellectual Capital Development at a Spin-Off Company" This chapter of Patrick H. Sullivan's book "*Profiting from Intellectual Capital: Extracting Value from Innovation"* appears with permission. (New York: John Wiley and Sons, 1998)

Willy Manfroy, Fairfield Resources International, Inc.

Hany Gwinnell, Eastman Chemical Company

In this chapter, we describe how a spin-off company, namely Eastman Chemical Company, is developing its intellectual capital management (ICM) program.

Background

Eastman Chemical is a $5 billion USD multinational chemical company. On January 1, 1994, it was spun off from Eastman Kodak as a completely independent company. Eastman Chemical's roots go back to 1920 as a source of raw materials for Kodak's photographic business. Its product line evolved as Kodak's needs for specific intermediates and raw materials grew and diversified. Over the decades, it ventured from methanol (the original product) into photographic intermediates, coating intermediates, chromophores, and polymers such as cellulose acetate derivatives and polyesters. The company's early dependence on Kodak was critical in shaping its intellectual property strategies. Because Eastman's primary goal was to be a reliable and cost effective source of critical components for Kodak's photographic needs, process development rather than product and application development was emphasized early on. Also, because of Kodak's dominance in the photographic area, Eastman minimized its efforts to protect and exploit its intellectual assets. Over the years and with the reduced importance of Kodak as a sole customer, this philosophy changed gradually; but, even in the early 1990s, Eastman had done little to protect its intellectual properties. At that time, Eastman was operating as a separate division (not a subsidiary), and realized that, over the long run, its ties with Kodak would be significantly altered and that the company should prepare for an eventual split.

Eastman revisited its vision and strategies. It reorganized its very structured and pyramidal organization, which was well suited for a diverse manufacturing entity, into a highly matrixed one, shifting its emphasis to globalization and markets (in fact, a hybrid between market and products). Until then, the company's patent strategy had been driven by the manufacturing process; it had little or no foreign coverage and almost no end-use application patents. Intellectual property (IP) management was done with minimal or no input from the different stakeholders within the company and was driven from the top down. In other words, patenting had been a relatively low-priority activity.

Eastman had been drafting, filing, and prosecuting all of its domestic patents in Kingsport, Tennessee. International filings were done by Kodak at its headquarters in Rochester, New York. Trademark activities were handled in Rochester as well. Copyright work was done in Kingsport but without all the required emphasis.

Except in the early 1950s, little or no out-licensing occurred. The major exception was for the process of making cellulose acetate filter tow, which was extensively licensed to Eastman's major competitors in the field.

In-licensing was done to develop new manufacturing processes as required. No formal licensing process or licensing strategy was in place. The fewer licenses entered, the happier management was. Knowing this, the licensing and legal departments pursued a risk avoidance culture.

First Steps

After Eastman adopted its new strategic vision, however, it became imperative to change the company's culture and put in place an intellectual asset management strategy. As a first step and over a period of two years, an IP management process was put in place, based on benchmarking with major chemical producers such as Dow Chemical, Rohm & Haas, and Du Pont. A multifunctional team including technology, patents, research and development, technical service, manufacturing, business, and licensing staff drove the process to completion. Acting in parallel, R&D in concert with the business organizations, as the primary drivers, developed an elaborate innovation process to speed up new product introduction, reduce cycle time, and align innovation with market needs.

Also, as part of the new vision, the company reorganized along four dimensions: business, geography, function, and core competency. Not all these dimensions were equally developed at the start. Core competencies are the few institutionalized competencies that give an organization a sustainable competitive advantage. At the onset, Eastman defined its core competencies rather broadly, including technical (e.g., organic synthesis) and managerial competencies (e.g., site management, customer interface). Most were too broad to be able to manage a strategy around them.

Simultaneously, because the new outward and global look of the company was leading to a mushrooming of outside opportunities, the need to develop or redevelop processes governing outside contacts became apparent. As a result, joint ventures and alliances (JVA), licensing, and confidentiality processes were developed, as well as thorough management training programs for handling alliances.

As all of this was happening, Kodak's board of directors decided to refocus the company on its core businesses. A decision was made early on to spin off the chemical business as a stand-alone company.

Spin-Off

Soon after the spin-off was successfully completed in January 1994, it became apparent that it was necessary to inventory the company's patent portfolio to align it with existing businesses and eliminate unused patents. It was also an excellent opportunity to evaluate the company's overall intellectual property assets. With several starts and stops, this evaluation took approximately two years. Simultaneously, the company probed deeper into its true core technical competencies to develop their strategic management. The resulting assessments led to the definition of the company's technical "engines," which are covered in more detail later.

The final phase of this journey was the integration of all of these efforts into a coherent, company wide intellectual capital management strategy, a process that continues today. The need for that IP management effort was exacerbated by the inability of the company to educate Wall Street and the investing public as to the true nature of its business and of its earning potential. Eastman's business is mostly as a supplier of intermediates that go into such diverse applications as additives for paints, coatings and inks, photographic chemicals, and plastic fabrication. Very few products are recognized by the public except for PET (polyethylene terephtalate), which goes into soft drink container bottles.

We now examine in more detail the key elements of some of the processes that compose the company's intellectual capital, starting with the intellectual property management process, followed with patent mapping,

technology engine development, and the licensing, joint ventures, and alliances processes. These processes represent some of the founding blocks needed to establish a comprehensive strategy for intellectual capital management.

The Intellectual Property Management Process

The intellectual property management process was the result of approximately three years work by a patent process quality improvement team. This team had representatives from the company's internal business organizations-research, corporate development, and the legal department. Interestingly, the process that was eventually put in place reflected this same mix in its makeup.

Intellectual Property Management Process Teams

The patent process quality improvement team recommended the formation of intellectual property management teams for each business organization. Each new intellectual property management process team was given the charter to manage international filing, technology disclosure, sampling, priority and cost strategies from a business organization perspective. Specifically, the team was asked to ensure that:

- The organization's patent strategy matched the organization business strategy
- The patent strategy was adequate
- The international filing recommendations and renewals were relevant and accurate

The team was also to facilitate the movement of ideas to patent assets. An additional benefit of the team was increased intellectual property education for all those involved in the process. Other features of the process were the strong involvement of the business people in the organization and the use of a patent facilitator to energize and oversee the process.

Each team is led by a business organization technology manager who has a technology background but is part of the business organization, a sort of go-between between the research organization and the business organization. The team also includes:

- Manager from the research and development area
- Technology engine team leader
- Legal representative (usually the intellectual property attorney associated with the particular business organization)
- Licensing representative

The Intellectual Property Facilitator

A significant factor is the number and variety of people involved. At different points in the process, the participants include the inventor, the inventor's supervisor, the research and development manager, the business organization stakeholder, the intellectual property attorney, the intellectual property facilitator, and a patenting mentor (see Exhibit 12. 1).

The patenting mentor is typically a retired Eastman scientist well versed in the patenting process, who assists the inventor with collecting his or her ideas and writing the invention disclosure. Business organization support for the invention is addressed very early on in the process (as can be seen in Exhibit 12.1). The research and development group is also treated as a business organization and given the opportunity to support an invention.

Very early in the process, a meeting is held between the inventor and the attorney who will be drafting the patent application. This meeting helps the inventor at an early stage determine what additional work may be necessary to support the patent application. It also allows the attorney to become more knowledgeable about the invention and to discuss the filing schedule with the inventor.

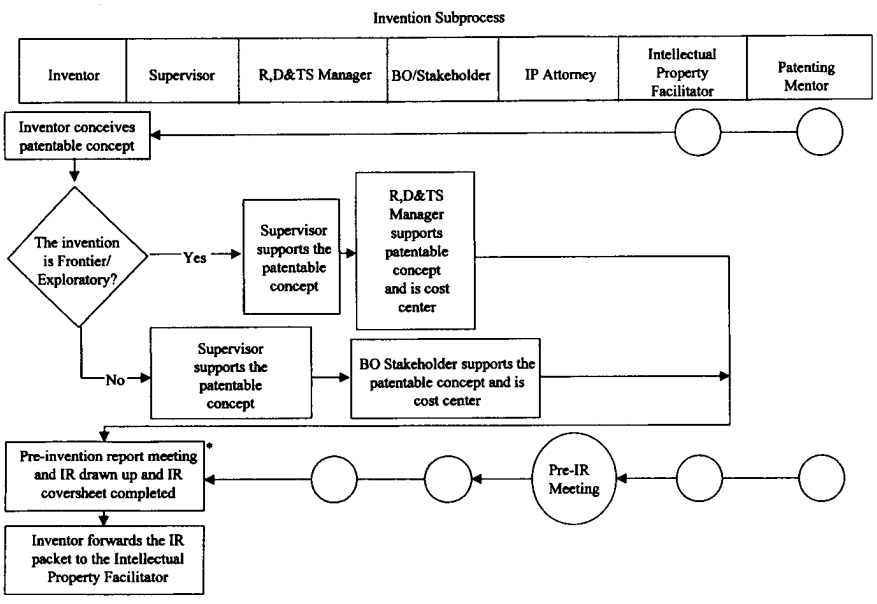


Exhibit 12.1 Overview of Eastman Intellectual Property Process

From that point on, the intellectual property team is involved in (see Exhibit 12.2):

- Establishing priorities
- Making international filing recommendations
- Raising disclosure and sampling issues
- Reviewing subsequent intellectual property renewals
- Handling related copyright and trademark issues

Although the process was originally designed at a business organization level, it is now managed by the business units. Each of the original 13 teams has split into 2 or 3 teams within the business organization, resulting in approximately 37 business unit teams. Because each team has responsibility for a smaller number of intellectual properties, and there are fewer people on each team, the process is more manageable.

Patent Mapping

Another significant intellectual capital management tool used at Eastman is the patent mapping process introduced to Eastman by Pat Sullivan of the ICM Group. The process is used in the early stages of business development to analyze the strategic development possibilities for a new technology.

In brief, it is an analysis tool with three elements:

- Developing a technology tree
- Developing a patent tree off the technology tree
- Analyzing the trees to develop:
  - A business strategy
  - A patent strategy
  - An additional technology strategy where appropriate

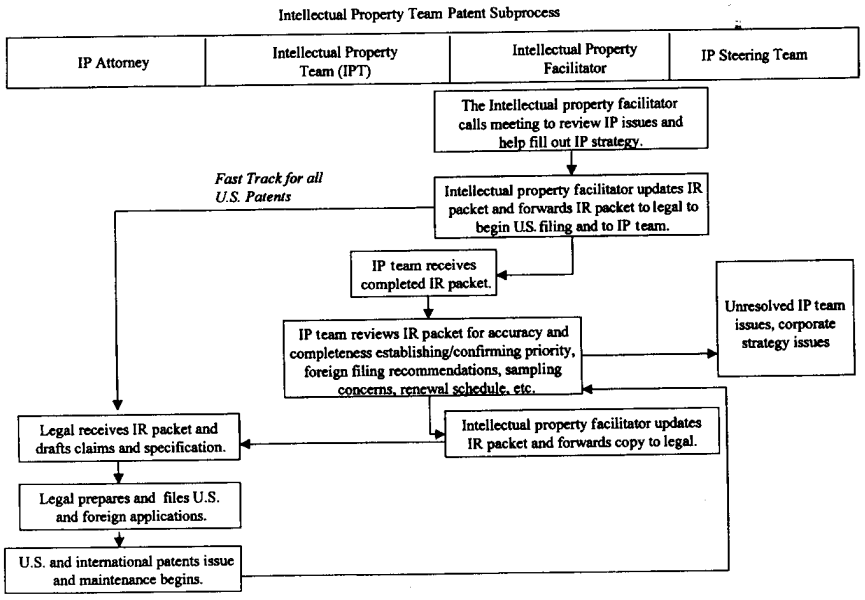
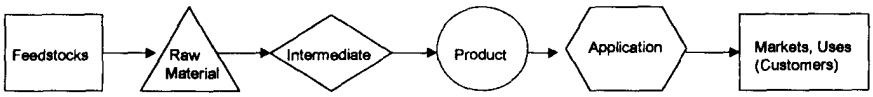


Exhibit 12.2 Overview of Eastman Intellectual Property Process

While simple in its description, the process requires much in the way of preparation, especially ensuring that the appropriate people are involved. It is important to have both key business and technical people involved in commercialization of the technology. While the tree is being put together, it will be analyzed, expanded and redone, in some instances many times. The result provides valuable technological information to the business people and business information to the technologists. At the same time, it clarifies goals and objectives for all parties. It identifies the necessary technology for the business, the complementary technology, and in some instances the competing technology. Once the technology tree is completed, patent searches are performed in the different areas of technology to put patent leaves on the technology tree.

Probably the most important benefit of patent mapping is to assemble in one place the thoughts, goals and strategies of the business, technical and legal areas, resulting in alignment, focus and combined energy in a single direction. It is a very powerful analysis tool.

The Technology Engine Process



Technology Engines

- Raw material engines – Primary purpose is to provide basic chemical building blocks.
- Intermediate engines – Primary purpose is to provide intermediate products used by other engines. These products may or may not be sold externally.
- Product engines – Primary purpose is to produce products for external sales. These product(s) can be used by a company through its application engines.
- Application engines – Primary purpose is to: (1) Modify existing products through formulations, (2) use existing products in new markets, and (3) demonstrate new products in customer end-use applications.

Exhibit 12.3 Engine Classification

The technology engine process was developed as a management tool around the technology core competencies. The reasons for developing such a process were multiple, including the need to:

- Identify the key technical strengths (the technology engines) of the company
- Assess the strength and weakness of each of the competencies
- Define at which level the competencies can be managed strategically
- Identify interactions and interdependence and determine which ones are core
- Align product and service offered with these competencies and determine gaps and overlaps
- Identify the human capital associated with each of the competencies

A multifunctional team was set up to tackle the problem. Each major research division had a representative at the director level as well as representatives from legal, development, technical service, business, and strategic alliances. Initially, the team struggled with its mission and how to approach it. Every function came in with a different agenda. A high level of skepticism on the value and feasibility of the project was prevalent. The first task of the team was to define its mission in clear and actionable items (as previously defined). Once the team had reached consensus, it labored to define the technology groupings and engines and to classify the technologies by type (see Exhibit 12.3). The major issues it faced were first to identify all potential "engines," their relevance and their interdependence. As an example, the team worked countless hours before it realized that by categorizing the technologies into where they fit into the value chain (raw material, product, process, applications), it could deal more easily with cross-functional expertise and reduce the number of engines to a manageable number.

Thereafter, the inventory of all technologies as well as their initial assessment was relatively simple. The team developed a complex flowchart that defines all engines for the company, their interaction and their interdependence. Exhibit 12.4 shows how two technology groupings relate to two product groupings applications through multiple technology engines. It allows one to quickly grasp the interrelationship of those technologies and its effect on market and uses.

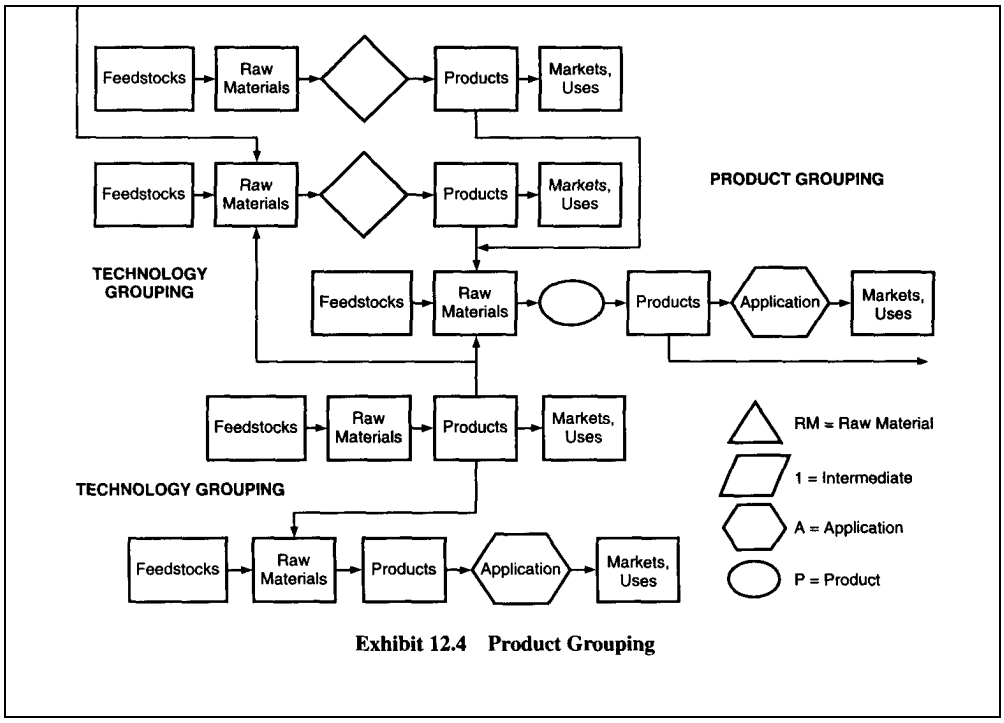


Exhibit 12.4 Product Grouping

Over the next year, the team developed one of the engines as a test and an example. The resulting strategy was presented to upper management, which endorsed it. Over the next two years, an organization was put in place to take full advantage of this new developed management tool.

R&D management also uses the technology engine process to quickly assess the potential for new innovations. Exhibit 12.5 shows how the company's different functional groups interface: from the technology and innovative management teams (TIM teams), through the business unit managers and the technology engine teams, all the way to upper management (executive team).

A similar chart can be plotted showing market position and technology type (see Exhibit 12.6). In this figure, the markets are divided according to Eastman's knowledge fit and its novelty to the world. The technology is again classified by novelty. It allows management to see where its assets are positioned in the marketplace and to evaluate overall risk as well as risk by individual engine or project.

A fully developed technology engine assessment includes the following elements:

- A description of the technology
- The company's strategy for its use
- The linkage with other engines
- Key products and business units affected
- An analysis of how the other engines support the engine under discussion
- A summary of the proposed strategy, including current level of support and strategy options with key program linkage
- The expected value of the option selected
- An analysis of the human capital distribution supporting the engine

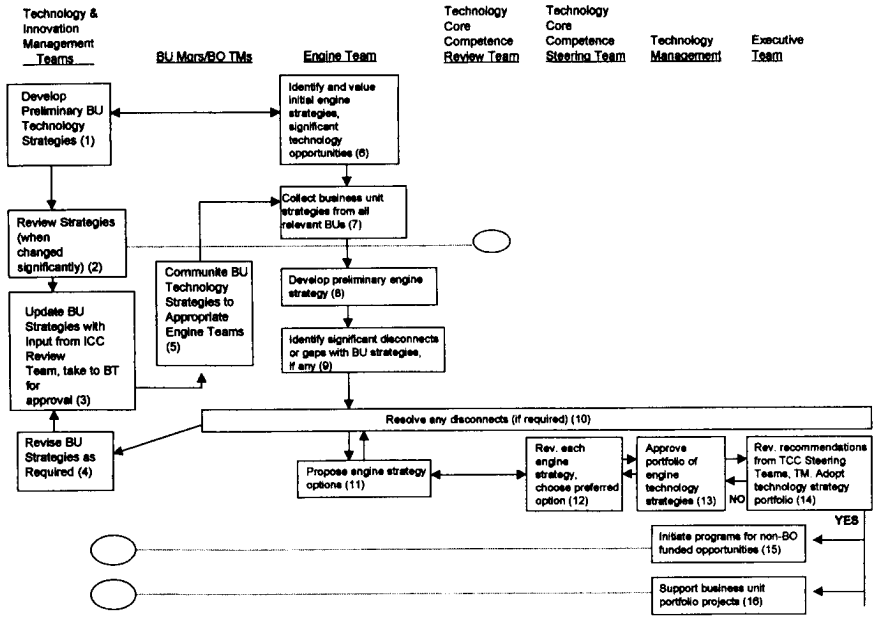


Exhibit 12.5 Technology Strategy Integration Process

The Licensing Process

The development of the licensing process came in two phases: first, the licensing itself and, later, tying the IP process to the licensing process.

Eastman had two main concerns: (1) improving the efficiency of the licensing process to avoid the stress and frustration earlier licensing efforts had created, and (2) making sure that in- and out-licensing decisions were made in the best interest of the corporation.

The process needed to be simple, easily understood, comprehensive, nonintrusive, and inclusive of, and accepted by, all stakeholders. A multifunctional team made up of senior managers of the R&D, legal, manufacturing, external technology evaluation, and strategic alliances and licensing departments was set up to accomplish this task. It took six months and more than 15 iterations to finalize the process.

Even then, a process to define how potential candidates for licensing would be brought into the process ("feed-in" phase) was missing. The "feed-in" phase needs to be completely integrated with the patent /IP management process, as it becomes the responsibility of the technology and innovation management teams to screen all intellectual property (patents and know-how) for their appropriateness for licensing. This phase of the process is still being implemented, and its success will rely on the willingness of these teams to include licensing as a strategic option, and on management support. It will require a significant change in the mindset of the corporation. The role of the IP attorney and the licensing manager will be to act as conscience and champion.

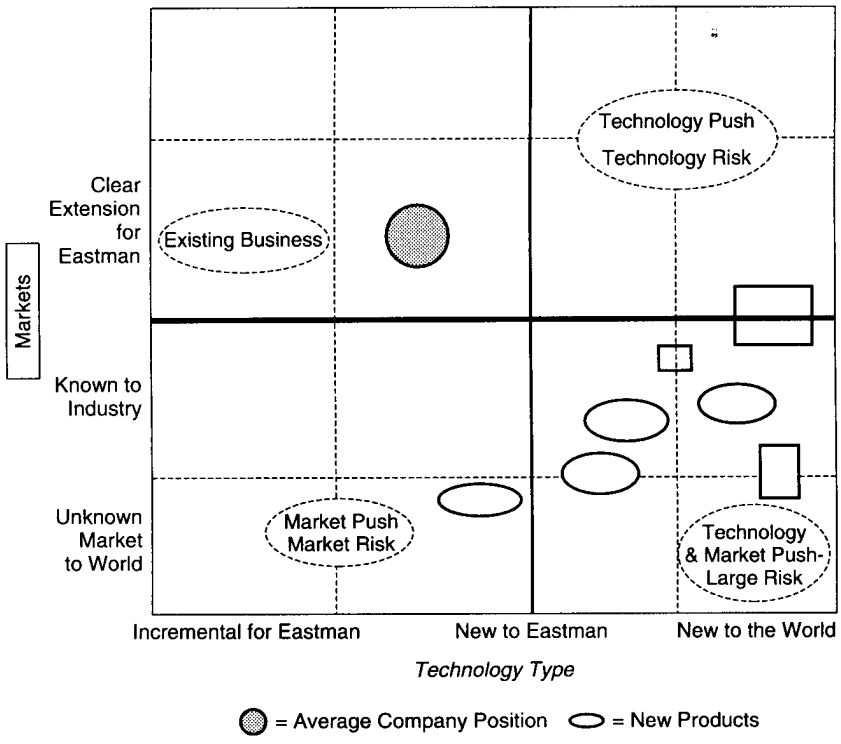


Exhibit 12.6 Positioning and Evaluating Assets

The key elements of the remainder of the process are to get preliminary and final stakeholder approval of the decision to license.

The final responsibility to go ahead with licensing lies with the primary stakeholder and is based on the input of the other functions. No veto power is given to any particular function, but it is expected that objections will be dealt with by the primary stakeholder before execution of the final contract. The principles and responsibilities of all those involved in the licensing decision are laid out in Exhibit 12.7.

The Joint Venture and Alliance Process

After Eastman made the decision to broaden its scope and globalize, management sponsored a major initiative to develop a process and a training course to give managers background and expertise in developing joint ventures and alliances. First, a multifunctional team outlined the principles and defined the curriculum.

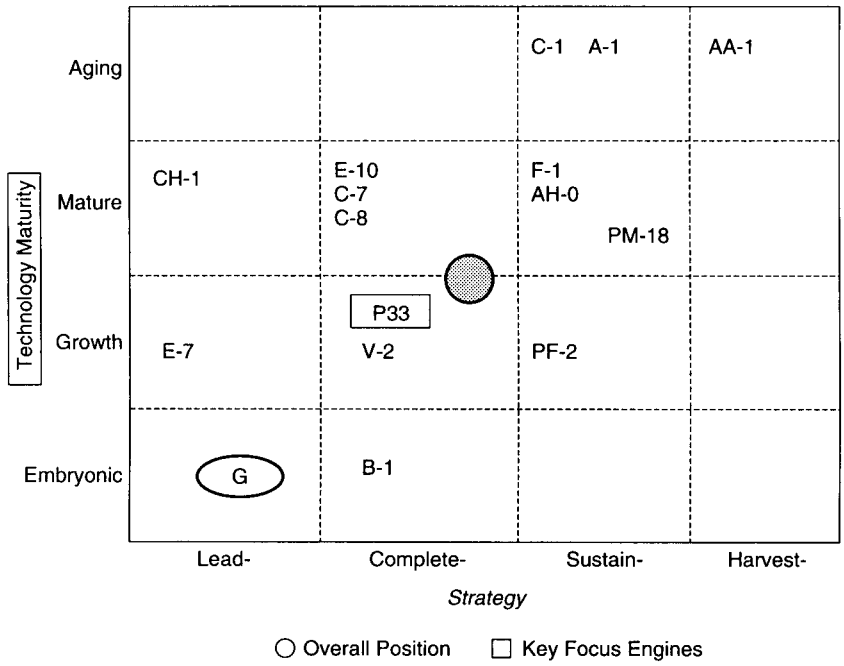


Exhibit 12.7 How Maturity Affects Strategy

Eastman's program uses exercises, case histories and internal examples that are relevant to the participants. This focus is particularly important in Eastman's case because of the internal culture needed to evolve from a monolithic manufacturing style to one that emphasized diversity and conflict resolution. The resulting course has been integrated into the training curriculum for all management.

At the same time, the process for developing alliances and joint ventures was developed at two levels: an executive overview, and a more detailed overview which covered specific tasks for each function at each stage of the project. Exhibit 12.8 shows the "gates" or decision points needed to progress from one stage to the next. The teaching of this process has been incorporated into the training course.

The major difficulties in developing the process were agreeing on the steps, authorizations and reviews required to pass from one stage to the next. It was difficult to separate the need-to-know from the desire-to-know issues; that is, to make the required authorizations and reviews sufficient and comprehensive without being burdensome and superfluous. Exhibit 12.8 captures the increasing complexity and depth of the due diligence and negotiation phases and includes a description, by function, of the tasks to be completed at each stage.

Specifically, the JVA process covers the evaluation of business opportunities when the company takes an equity position through joint venture, merger or acquisition. Other business alliances, such as divestitures, licensing, joint technology development, marketing alliances and tolling arrangements, are not covered by this process.

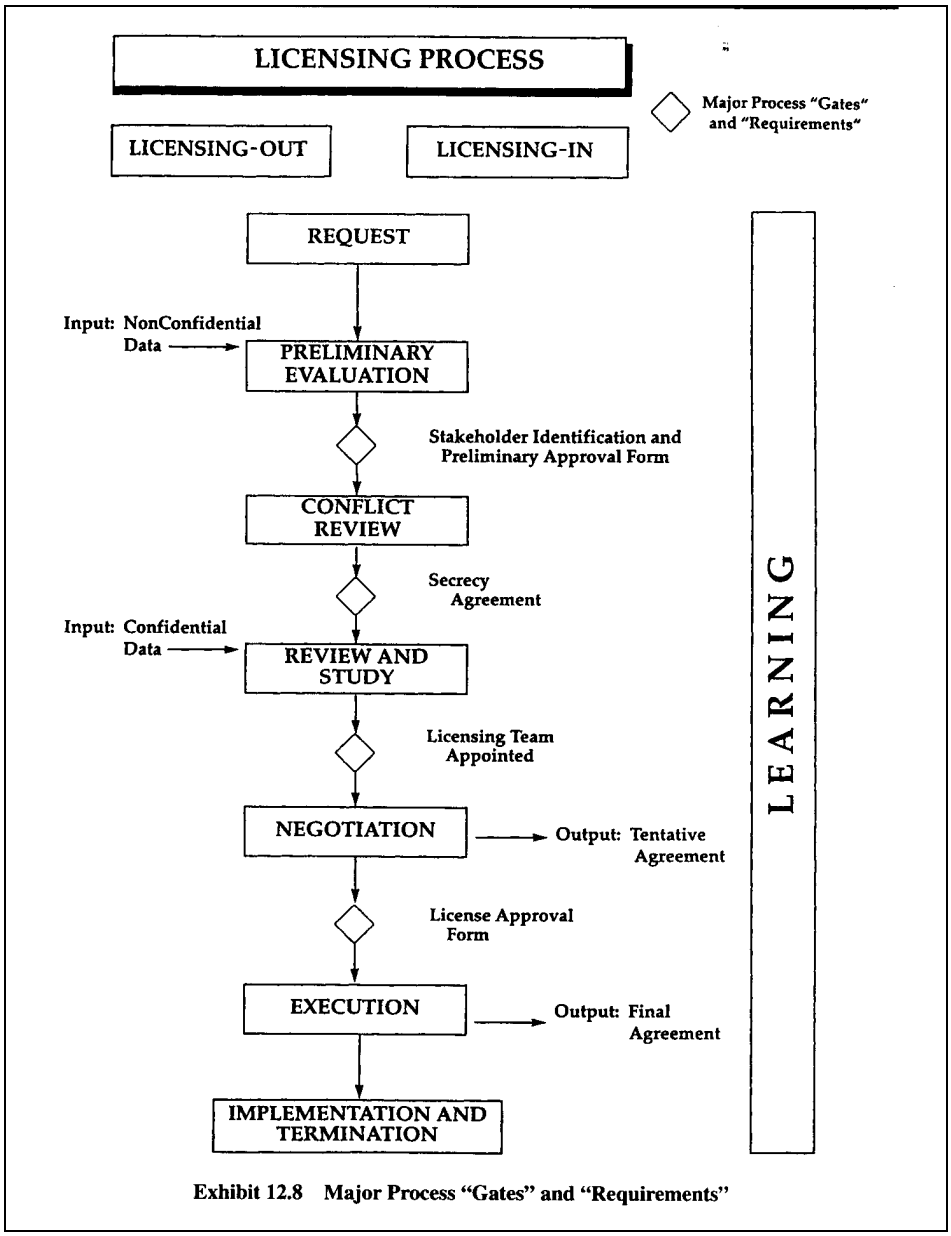


Exhibit 12.8 Major Process "Gates" and "Requirements"

The company pursues JVAs as a way to achieve strategic business objectives. Joint ventures can be:

1. *Resource-driven* when the prospective partner provides financing, key raw materials, underutilized physical plant facilities or technology

2. *Market-driven* when the prospective partner provides local market access and knowledge or products that broaden or diversity the company's product line

3. *Risk-driven* when the inclusion of a prospective partner results in economies of scale, cost-sharing, or expedience

Acquisitions can provide assets at lower-than-replacement cost and expedite the attainment of the company's objectives. In evaluating JVA opportunities, the company's objective is to determine whether a JVA is the best way to achieve the strategy, not to "find a way to make the deal."

An efficient process for evaluating JVA opportunities is essential. Overseen by the corporate development unit, the company's JVA process:

- Involves few people in the early stages when confidentiality is important and the decision to proceed has not been made
- Addresses screening, evaluation and implementation issues separately
- Proceeds step by step through each stage of the decision process
- Can be halted at any time if a project is determined to be infeasible

Input from many areas of the company is typically required to ensure proper evaluation of a JVA opportunity. Involvement of the internal business organizations likely to be responsible for managing a JVA is essential for successful implementation. Confidentiality is frequently critical to successful negotiation; information should be shared only on a need-to-know basis.

Steering committees composed of members of management in the key business and functional organizations affected by a JVA are used to review the content and process of JVA evaluations. The steering committee approves movement of JVA projects from stage to stage.

Discussion: Strategy & Intellectual Capital

- *Discuss aligning IP protection with business strategy according to the following issues.*
  - *Is the IP aligned with the core technology of the business?*
  - *How to choose IP protection*
  - *How do you budget for knowledge management and knowledge ownership ?*
- *The advantages of IP searching are many. IP searching is a valuable way of determining whether or not an invention is patentable. Searching can also reveal other significant information, such as where competitors are concentrating their resources, whether an invention can block a competitor from further developing its product, and whether there are any similar technologies that are more efficient.*
- *Discuss organization, finance and marketing, and how these elements contribute to the value of an organization.*
- *Competitive strategy*
- *Extracting value from effort*

Discuss the Eastman Chemical Case Study

Referring to Patrick Sullivan's book.[2]

- *Discuss the diagrams of the two basic models that are often used in intellectual capital. Use these as a framework for analyzing organizations.*
- *Which of the two models is more flexible?*
- *How would one prioritize the types of intellectual capital listed above?*
- *Are any of the types of intellectual capital interrelated?*
- *How would the models change for public sector vs. private sector organizations?*
- Do these models provide an adequate framework to assess the value of an organization?

[2] Patrick H. Sullivan, *Profiting from Intellectual Capital: Extracting Value from Innovation* (New York: John Wiley and Sons, 1998).