APPENDIX 1C

Intellectual Property Economics on Real Options in Patent and Intangible Valuation

The following is contributed by A. Tracy Gomes, President and CEO of Intellectual Property Economics, LLC, located in Dallas, Texas. Gomes's firm specializes in the valuation of intellectual property and intangibles, for the purposes of corporate financial planning and tax transactions.

Real options analysis is designed to explicitly incorporate and analyze risk and uncertainty associated with real assets. Intellectual property (IP), whether defined in its strictest, most narrow legal sense—patents, trademarks, trade secrets, and copyrights—or more broadly to encompass all intellectual/intangible assets created from human conceptual endeavor, is the poster child of uncertainty, and exemplifies the great challenge and promise that is real options analysis.

In this information- and knowledge-based age that is the postmodern economy, IP is the most fundamental and valuable asset in business today. From 1978 to 1998, the composition of market value of the S&P 500 has been transformed from 80 percent physical assets, 20 percent intangible assets, to 20 percent physical assets, 80 percent intangible assets.[1] Since 1990, the annual revenue realized from just the licensing of patented technology has grown from less than $10 billion to nearly $120 billion (not counting the direct administrative and maintenance costs, which are likely less than one-half of one percent; that is $120 billion in net, bottom-line profit).

But this is just the IP that is visible, that the marketplace can actually see and has already put a value on. The goal and application for real options analysis lies in the vast uncovered trove of IP that is unseen and hidden, and like a giant iceberg lies just below the surface. For younger, emerging companies, this is likely to be IP that is in process—research and development

projects in varying stages of development. For older companies, IP value is likely to be found not only in those efforts still in the pipeline but perhaps even more so in those efforts long ago completed and placed on the shelf.

Kevin Rivette, in his seminal book, *Rembrandts in the Attic,* recounts the embarrassing legacy of Xerox, which discarded such "worthless" ideas as the PC, laser printing, the Ethernet, and graphical user interface (GUI), only to see them transformed from trash to cash by someone else. Leading industry companies have gotten religious and are fast about combing through their patent portfolios. Procter & Gamble, after a three-year internal audit, estimates that it is utilizing only about 10 percent of its 25,000-patent portfolio. Dupont has allocated each of its 29,000 patents to one of 15 business units. And IBM has literally thrown open its vaults, declaring each and every patent, each technology and process, even trade secrets as potentially "up for sale."

Recognizing that something is of potential value, and knowing what the value of that something is, are two different things. Information and knowledge are the guideposts of strategic business decision making and the glue of economic transactions. When information is incomplete or unknown, business decisions tend to be delayed and markets fail to clear. Stereotypical examples in the case of IP are the individual sole inventors who think their ideas are worth millions and the giant multinational corporations who are only willing to pay pennies. Unfortunately, the reality of today's IP business transactions is all too often characterized by divergent bid/offer sheets, lengthy negotiations, and tortured contractual terms,[2] leading to excessively high and wasteful transaction costs. Perhaps even more disheartening are the thousands of IP deals in which buyer and seller don't even get a chance to meet—IP left orphaned on countless Internet exchanges, or projects abandoned or put back on the shelf because they are thought to be too costly or their markets too remote or too shallow.

It is here that real options analysis holds so much promise, to be applied to those IP assets and projects that were thought to be too vague, too unknown, and too iffy. Not that it can predict the future success or failure of IP development or the creation of some still hypothetical market, or that it can turn perennial duds into potential deals. Real options analysis is not magic, nor does it make risk or uncertainty vanish and go away. What it does do is attempt to make risk and uncertainty explicit through rational statistical means. In this way, uncertainty is bounded and risk quantified such that information becomes more clear and tangible, and the knowledge base expanded, thereby aiding decision making.

Unlike financial assets, there are no existing liquid markets for intangible "real" assets. Real options analysis seeks to change that by providing a means to demystify the risk and uncertainty surrounding IP and supply potential buyers and sellers with objective, quantifiable information to shortcut

uncertainty, clarify risk, and clear the path to shorter, smoother, and less costly IP deal making. Two examples provide a case in point.

A small automotive engineering start-up identifies a cutting-edge technology being developed by a private research institute. They approach the institute, seeking the acquisition or license of the technology. Given that the technology is a few years from commercialization, and the expectant market, which is being driven by governmental regulation (and resisted by manufacturers), is several more years into the future, instead of jumping into negotiations, the two sides agree to an outside independent economic analysis.

Due to cost considerations, simplified real options analysis was performed modeling future auto demand and holding government regulation constant. The real options valuation, though nearly twice as high as the conventional DCF analysis, gave both parties a clearer view of uncertainty and amount of risk facing the technology. After the two-month analysis, the parties entered into negotiations and within two months completed discussions, and drafted and signed an agreement.

A second case involves a medium-sized contract research organization with a proprietary portfolio of nearly 400 patents, processes, trade secrets, and disclosures spread over an area of half a dozen different fields of technology. Seeking to extract value from its IP assets, and develop an additional revenue stream, the firm selected a sampling of assets (in varying stages of development) from several of its portfolio segments and contracted for a risk assessment—the beginning stages of an options analysis prior to modeling. The assessment identified several key parameters, including various risks (technical, competition, and regulatory) as well as timing issues, both technical and market. And, while not a complete options analysis, the assessment did provide management with valuable, tangible information with which to assess and prioritize the sampling of assets and develop a template to evaluate all its IP on a go-forward basis.

Uncertainty and risk are nowhere more real and tangible than in the case of intellectual property. Understandably, this uncertainty makes firms hesitant in decision making regarding IP and virtually hamstrung in IP deal making. The role of real options analysis in IP is to identify and quantify uncertainty, to illuminate risk, and thereby to increase confidence and realize the full value of the IP.