Valuation and Pricing of Technology-Based Intellectual Property

Presented to the
Sault Ste. Marie Innovation Centre
Workshop on Intellectual Property

by
Michael M. Avedesian

11 December 2007
“.....it is the sign of an educated mind not to expect more certainty from a subject than it can possibly provide...”

Aristotle
Dilbert Understands Valuation

Dilbert / By Scott Adams

DOGBERT IS A CREATIVITY CONSULTANT
We don't need any of your "intuition" Mumbo Jumbo. We need quantitative data!

THE ONLY WAY TO MAKE DECISIONS IS TO PULL NUMBERS OUT OF THE AIR, CALL THEM "ASSUMPTIONS," AND CALCULATE THE NET PRESENT VALUE.

OF COURSE, YOU HAVE TO USE THE RIGHT DISCOUNT RATE, OTHERWISE IT'S MEANINGLESS.

Go away.
Business Reasons

Exclusivity Value:
- Price premium
- Reduced manufacturing cost
- Increased market share
- Enhanced customer satisfaction
- Blocking value

Option Value:
- Current technology and protection may provide an avenue for future investments

Defensive Value/
Freedom to Operate:
- Creates an IP arsenal to discourage lawsuits
- Provides ability to compete, but little advantage

Trading Value:
- Value in trade for entering into cross-licenses, for licensing-out, or for sale
Technology Often Provides Option Value

- Investments in patents and technology often provide value by creating the option to invest additional funds at a later time if the opportunity appears attractive.
- Purchasing the option to invest at a certain price at some later date is similar to a call-option to purchase stock.
- The option value created through investments in patents and technology can be estimated using:
  - Decision tree analysis
  - Option pricing models
Decision Tree Analysis

A simple example: value of an investment *without* an option

<table>
<thead>
<tr>
<th>Period 1</th>
<th>Period 2</th>
<th>Expected Payoff</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Invest $1,000</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Demand</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
  Probability = 80% | Payoff | $1,500 | $480 |
| Low Demand | 
  Probability = 20% | Payoff | $1,000 | $80 |
| High Demand | 
  Probability = 50% | Payoff | $750 | $225 |
| Low Demand | 
  Probability = 50% | Payoff | $500 | $150 |

Expected Value = Expected Payoff less Inv.
= $935 - $1,000
= <$65>

Rational decision is not to invest
Decision Tree Approach with Option

An option is the right, but not the obligation to act at a specified future time

**Period 1**
- **Invest $1,000**
  - High Demand Probability = 40%
  - Low Demand Probability = 60%
- **Invest $500**

**Period 2**
1. **High Demand**
   - Probability = 80%
   - **Payoff** $3,000
2. **Low Demand**
   - Probability = 20%
   - **Payoff** $2,000
3. **High Demand**
   - Probability = 80%
   - **Payoff** $1,500
4. **Low Demand**
   - Probability = 20%
   - **Payoff** $1,000
   - **Payoff** $750
5. **Low Demand**
   - Probability = 50%
   - **Payoff** $500

**Expected Value** = Expected Payoff less Inv.

= $1,795 - $1,500
= $295
# The Courts Understand Damages

<table>
<thead>
<tr>
<th>Parties</th>
<th>Award</th>
<th>Date</th>
<th>Source</th>
<th>Court</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Polaroid v. Eastman Kodak</td>
<td>$873,158,971</td>
<td>Jan-91</td>
<td>17 USPQ2d 1771</td>
<td>D. Massachusetts</td>
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<tr>
<td>2 Michelson v. Medtronic Sofamor Danek</td>
<td>$529,000,000</td>
<td>Oct-04</td>
<td>Wall Street Journal</td>
<td>W.D. Tennessee</td>
</tr>
<tr>
<td>3 Eolas Technologies v. Microsoft</td>
<td>$521,000,000</td>
<td>Aug-03</td>
<td>National Law Journal</td>
<td>N.D. Illinois</td>
</tr>
<tr>
<td>4 City of Hope Medical v. Genentech</td>
<td>$500,100,000</td>
<td>Jun-02</td>
<td>New York Times</td>
<td>Sup. Ct. California</td>
</tr>
<tr>
<td>5 Johnson &amp; Johnson v. Guidant</td>
<td>$425,000,000</td>
<td>Sep-03</td>
<td>National Law Journal</td>
<td>Arbitration Panel</td>
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<td>6 Johnson &amp; Johnson v. Medtronic</td>
<td>$270,000,000</td>
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<td>National Law Journal</td>
<td>CAFC</td>
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<tr>
<td>7 Haworth v. Steelcase</td>
<td>$211,499,731</td>
<td>Dec-96</td>
<td>43 USPQ2d 1223</td>
<td>W.D. Michigan</td>
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<tr>
<td>8 Hughes Tool v. Smith International</td>
<td>$204,810,349</td>
<td>Mar-86</td>
<td>229 USPQ 81</td>
<td>C.D. California</td>
</tr>
<tr>
<td>9 Procter &amp; Gamble v. Panagon Trade</td>
<td>$178,400,000</td>
<td>Jan-98</td>
<td>Press Release</td>
<td>D. Delaware</td>
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<tr>
<td>10 Exxon Chemical v. Mobil Oil</td>
<td>$171,000,000</td>
<td>Aug-98</td>
<td>Wall Street Journal</td>
<td>S.D. Texas</td>
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<tr>
<td>11 Guidant v. Medtronic AVE</td>
<td>$166,681,773</td>
<td>May-02</td>
<td>Judgment</td>
<td>Arbitration Panel</td>
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<tr>
<td>13 Masimo v. Nellcor</td>
<td>$164,000,000</td>
<td>Aug-04</td>
<td>CBS MarketWatch</td>
<td>C.D. California</td>
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<td>14 Hughes Aircraft v. United States</td>
<td>$154,000,000</td>
<td>Jun-94</td>
<td>Wall Street Journal</td>
<td>Federal Claims</td>
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<td>15 Intergraph v. Intel</td>
<td>$150,000,000</td>
<td>Oct-02</td>
<td>Wall Street Journal</td>
<td>E.D. Texas</td>
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<td>16 3M v. Johnson &amp; Johnson</td>
<td>$129,000,000</td>
<td>Dec-92</td>
<td>Dow Jones Newswire</td>
<td>CAFC</td>
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<td>17 Fonar v. General Electric</td>
<td>$128,705,766</td>
<td>Feb-97</td>
<td>Final Judgment</td>
<td>CAFC</td>
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<td>18 Mobil Oil v. Amoco Chemical</td>
<td>$120,000,000</td>
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<td>Press Release</td>
<td>D. Delaware</td>
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<td>19 Stac Electronics v. Microsoft</td>
<td>$120,000,000</td>
<td>Feb-94</td>
<td>National Law Journal</td>
<td>C.D. California</td>
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<td>20 Internet Magic v. Netfaxes</td>
<td>$114,000,000</td>
<td>Feb-02</td>
<td>National Law Journal</td>
<td>Sup. Ct. California</td>
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</tbody>
</table>

# IP Damages Settlements are Skyrocketing

<table>
<thead>
<tr>
<th>PARTIES</th>
<th>SETTLEMENT</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1 Michelson v. Medtronic</td>
<td>$1,350,000,000</td>
<td>Apr-05</td>
<td>Associated Press</td>
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<tr>
<td>2 Sun Microsystems v. Microsoft</td>
<td>$1,250,000,000</td>
<td>Feb-04</td>
<td>Press Release</td>
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<tr>
<td>3 Texas Instruments v. Hyundai</td>
<td>$1,000,000,000</td>
<td>May-99</td>
<td>Wall Street Journal</td>
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<td>4 Texas Instruments v. Samsung</td>
<td>$1,000,000,000</td>
<td>Nov-96</td>
<td>Wall Street Journal</td>
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<td>5 Medinol v. Boston Scientific</td>
<td>$750,000,000</td>
<td>Sep-05</td>
<td>Associated Press</td>
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<tr>
<td>6 NTP v. Research in Motion</td>
<td>$612,500,000</td>
<td>Mar-06</td>
<td>Wall Street Journal</td>
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<td>7 Northrop Grumman v. Honeywell</td>
<td>$440,000,000</td>
<td>Apr-04</td>
<td>Associated Press</td>
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<tr>
<td>8 Intertrust Technologies v. Microsoft</td>
<td>$440,000,000</td>
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<td>9 Pitney Bowes v. Hewlett-Packard</td>
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<td>Jun-01</td>
<td>Wall Street Journal</td>
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<td>10 Yahoo v. Google</td>
<td>$328,000,000</td>
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<td>National Law Journal</td>
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<td>11 EMC v. Hewlett-Packard</td>
<td>$325,000,000</td>
<td>May-05</td>
<td>Associated Press</td>
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<tr>
<td>12 Intergraph v. Intel</td>
<td>$300,000,000</td>
<td>Apr-02</td>
<td>Wall Street Journal</td>
</tr>
<tr>
<td>13 Medtronic v. Siemens</td>
<td>$300,000,000</td>
<td>Sep-92</td>
<td>Wall Street Journal</td>
</tr>
<tr>
<td>14 MicroUnity v. Intel</td>
<td>$300,000,000</td>
<td>Oct-05</td>
<td>Business Wire</td>
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<td>15 University of Minnesota v. Glaxo</td>
<td>$300,000,000</td>
<td>Oct-99</td>
<td>Press Release</td>
</tr>
<tr>
<td>16 Intermedics v. Cardiac Pacemakers</td>
<td>$250,000,000</td>
<td>Sep-98</td>
<td>National Law Journal</td>
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<td>17 Intergraph v. Intel</td>
<td>$225,000,000</td>
<td>Mar-04</td>
<td>Associated Press</td>
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<td>18 Gemstar v. General Instruments</td>
<td>$200,000,000</td>
<td>Nov-00</td>
<td>National Law Journal</td>
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<td>19 University of California v. Genentech</td>
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<td>Nov-99</td>
<td>Press Release</td>
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<td>20 Gemstar v. EchoStar Communications</td>
<td>$190,000,000</td>
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<td>Satellite Week</td>
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<td>21 Boston Scientific v. Medtronic</td>
<td>$175,000,000</td>
<td>Sep-02</td>
<td>Press Release</td>
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<td>22 Taiwan Semiconductor v. SMI</td>
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<td>Feb-05</td>
<td>National Law Journal</td>
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<td>23 Intergraph v. Intel</td>
<td>$150,000,000</td>
<td>Oct-02</td>
<td>Business Wire</td>
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<td>24 Genentech v. Eli Lilly</td>
<td>$145,000,000</td>
<td>Jan-95</td>
<td>Wall Street Journal</td>
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<tr>
<td>25 Intergraph v. Hewlett-Packard</td>
<td>$141,000,000</td>
<td>Jan-05</td>
<td>National Law Journal</td>
</tr>
</tbody>
</table>

Source: IP Litigation: FTI Consulting
Drug Development Process

Market

Value Creation

Source: Ernst&Young Convergence: The Biotechnology Industry Report, 2000

5,000-10,000 compounds screened

250 compounds enter pre-clinical

5 compounds go to Phase I
  80% pass Phase I

30% pass Phase II

80% pass Phase III

One compound makes it to Market

Discovery

Preclinical Testing

Phase I

Phase IIA

Phase IIB

Phase III

NDA
Risk vs. Valuation Correlation of a Drug

Probability of Failure

Development Risk

Valuation

$15
$61
$115
$176
$311
$624
$825

Market Valuation of a US$275M (peak sales) product

Pre-Clinical
Phase I
Phase IIA
Phase IIB
Phase III
NDA Filing
Market & Manufacturing

Source: MDS
Commercialization Strategy

**SPIN-OFFS VERSUS LICENSE**

- **SPIN-OFF**
  - LICENSE/SPIN-OFF
  - LICENSE
- **SPIN-OFF**
  - LICENSE
  - LICENSE
- **SPIN-OFF/LICENSE**
  - LICENSE
  - LICENSE

**Product**

- NEW
- EVOLVING
- EXISTING

**Market**

- NEW
- EVOLVING
- EXISTING

NEW Technology
Costs of Commercialization

COSTS AND RATIOS

Begin Research  1st Key Patents  Pre-Development  Product Development  Gating Items  Production  Endorsement  Market Adoption

UNIVERSITY  THE GAP  INDUSTRY

Costs as Percent of Revenue

1-3%  .2-.6%  5-15%  0-10%  25-15%  70-55%

Number of Candidates Surviving

100  18  8  6  4  2  1
Some Licensing Statistics and Information

- Global licensing revenue is greater than $150 billion and is growing at 25% to 35% per year

- IBM collected more than $1.5 billion in royalties in years past (and donated 500 patents for open source)

- Microsoft paid more than $1.4 billion in royalties in years past (and is looking to cross-license with the 30-40 top technology companies)

- Intellectual Ventures raised more than $350 million to execute its strategy of acquiring patents which has added liquidity to the market
IP Valuation Authorities / Standards

- Uniform Standard of Professional Appraisal Practice (USPAP)
- American Society of Appraisers (ASA) - Business Valuation
  - Issued draft IP valuation standards (2005)
- American Institute of Certified Public Accountants, AICPA (Statement on Standards for Valuation Services, Jan. 2008)
- SFAS 141 (purchase price allocation/valuation)
- SFAS 142 (impairment testing)
- Internal Revenue Code (IRC) Section 482
- Financial Accounting Standard (FAS) 157 Fair Value Measurement
- Many Others
An IRS Definition of Fair Market Value

- Fair Market Value is defined as the price at which property would change hands between a willing buyer and a willing seller, neither being under any compulsion to buy or to sell, and both having reasonable knowledge of relevant facts (Estate Tax Regs., Sec. 20.2031-1(b); Rev. Rul. 59-60, 1959-1 C.B. 237)
### Six Methods of Technology Valuation and Pricing

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Industry standards</td>
<td>1. Find as many relevant and comparable agreements</td>
</tr>
<tr>
<td>2. Rating/ranking</td>
<td>2. Refinement of 1. with formal differentiation</td>
</tr>
<tr>
<td>4. DCF using RAHR</td>
<td>4. Magnitude and timing of future cash flows, risk adjusted</td>
</tr>
<tr>
<td>5. Monte Carlo</td>
<td>5. Refinement of 4. using probability analysis of estimated ranges to arrive at a statistical prediction</td>
</tr>
<tr>
<td>6. Auction</td>
<td>6. Create a market for the specific opportunity</td>
</tr>
</tbody>
</table>
Price vs. Value

“Price is what you pay. Value is what you get.”

-- Warren Buffett
Royalty

Royalty = royalty rate % \times royalty base $

- Royalty base = \text{(revenue received by the licensee for sales of products or services incorporating the IP) \ - \ (specified deductions which may include shipping, insurance, returns, allowances etc.)}

- Royalty base factoring (stacking) when IP contributes to or affects only a part of the overall product
Royalty Base > Revenues

- Buyer has non-competitive ink jet printer technology with excellent inks
- Seller has excellent printer technology
- Because of the competitive market, margins on printers very low whereas margins on inks very high
- Seller’s printer technology will allow buyer to increase market share thus enabling greater high margin sales of ink because consumers will preferentially buy ink from the printer manufacturer.
Exclusivity and Size of the Licensed Market

- Do I license exclusively at a higher royalty rate to one licensee who in turn will have a modest market penetration or......

- Do I license non-exclusively at a lower royalty rate to multiple licensees who in aggregate may reach close to 100% of the license addressable market

- Depends on market conditions (sole vs. multi-source)

- Stanford and UCSF licensed its Cohen-Boyer gene splicing patent to over 500 companies and received $250M in royalties over the lifetime of the patent in the USA market
Cost as a Method?

- With few exceptions, seller’s costs are irrelevant.
- What the seller bought by investing in R&D and IP protection was an option to a business opportunity that would result from an R&D success.
Method 1.- Industry Standards

- Database of previous deals in sufficient number and specificity
- Notion of “norms”, however exceptions can and do occur
- Characterized by two factors: `category & quality`
The Universal Paradox

How can different things be comparable?

- how can any previous agreement be “like” my opportunity?
- There are so many unique dimensions to a technology deal

Although no two deals are ever exactly alike, behind the differences there are certain business universals such as projected sales, profit, required resources investment, overall perceived risk and uncertainties that guided the parties in reaching the terms of their agreement.
# Industry Standards

## Three Variants

<table>
<thead>
<tr>
<th>i) Market or comparable approach</th>
<th>i) Historical transactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ii) Paradigm licensing rates</td>
<td>ii) Use of widely accepted standard rates and terms</td>
</tr>
<tr>
<td>iii) Rating/ ranking method 2.</td>
<td>iii) Historic agreements using systematic comparisons</td>
</tr>
</tbody>
</table>
Market Approach: Determining Similarity of Comparables

- What are the specific rights conveyed in transaction?
- Arm’s-length transaction?
- Special financing terms available
- Economic conditions at the time of transaction
- Inclusion of non-IP assets in the transaction
- Functional characteristics of the guideline IP
- Technological characteristics of the guideline IP (stage of development)
- Economic characteristics of the guideline IP
- Legal characteristics of the guideline IP
- Other factors
Sources of Information

1. Surveys
2. Proposed or established norms
3. Shopped term sheets, price lists
4. News, publications, and the licensing society/ practitioner network
5. Journals, proprietary databases, reports and consultants
6. Published agreements
7. Court cases
8. Lifetime and organizational learning
Surveys

- [http://www.cptech.org/ip/health/royalties](http://www.cptech.org/ip/health/royalties)
- [http://www.lesi.org/lesnouvelles/](http://www.lesi.org/lesnouvelles/)
<table>
<thead>
<tr>
<th>Primary Industry</th>
<th>0–2%</th>
<th>2–5%</th>
<th>5–10%</th>
<th>10–15%</th>
<th>15–20%</th>
<th>20–25%</th>
<th>OVER 25%</th>
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</thead>
<tbody>
<tr>
<td>Aerospace</td>
<td>35.0%</td>
<td>40.0%</td>
<td>55.0%</td>
<td>5.0%</td>
<td></td>
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<tr>
<td>Automotive</td>
<td>18.0%</td>
<td>57.4%</td>
<td>20.0%</td>
<td>0.5%</td>
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<td></td>
<td>0.1%</td>
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<tr>
<td>Chemical</td>
<td>42.5%</td>
<td>57.5%</td>
<td>50.0%</td>
<td>45.0%</td>
<td>5.0%</td>
<td>25.0%</td>
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<td>Computer</td>
<td>50.0%</td>
<td>15.0%</td>
<td>10.0%</td>
<td>25.0%</td>
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<td>Electronics</td>
<td>50.0%</td>
<td>50.0%</td>
<td>50.0%</td>
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<tr>
<td>Energy</td>
<td>12.5%</td>
<td>62.5%</td>
<td>25.0%</td>
<td>25.0%</td>
<td>25.0%</td>
<td>25.0%</td>
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<tr>
<td>Food/Consumer</td>
<td>21.3%</td>
<td>51.5%</td>
<td>20.3%</td>
<td>2.6%</td>
<td>0.8%</td>
<td>0.8%</td>
<td>2.6%</td>
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<tr>
<td>General Mfg.</td>
<td>7.9%</td>
<td>38.9%</td>
<td>36.4%</td>
<td>16.2%</td>
<td>0.4%</td>
<td>0.6%</td>
<td></td>
</tr>
<tr>
<td>Gov’t/University</td>
<td>10.0%</td>
<td>10.0%</td>
<td>80.0%</td>
<td>87.0%</td>
<td>87.0%</td>
<td>87.0%</td>
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<tr>
<td>Health Care Equip.</td>
<td>13.0%</td>
<td>20.7%</td>
<td>67.0%</td>
<td>1.3%</td>
<td>0.7%</td>
<td>0.7%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>11.2%</td>
<td>41.2%</td>
<td>28.7%</td>
<td>16.2%</td>
<td>0.9%</td>
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<tr>
<td>Telecommunications</td>
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<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Example Market Approach: Lump-sum Value

- Patent valuation – convert data to “common” basis

<table>
<thead>
<tr>
<th>Seller/Licensor</th>
<th>Buyer/Licensee</th>
<th>Date</th>
<th>Terms</th>
<th>Number of U.S. Patents</th>
<th>Price Per Patent</th>
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</thead>
<tbody>
<tr>
<td>Infineon and Qimonda (50 worldwide patents)</td>
<td>Mosaid</td>
<td>June 2006</td>
<td>$12 million</td>
<td>Est. 10</td>
<td>$1.2 million</td>
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<tr>
<td>3COM</td>
<td>Undisclosed</td>
<td>April 2006</td>
<td>$1.05 million</td>
<td>1</td>
<td>$1.05 million</td>
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<tr>
<td>Tessera</td>
<td>2006</td>
<td></td>
<td>$45.6 million (total licensing fee)</td>
<td>5</td>
<td>$9.1 million</td>
</tr>
<tr>
<td></td>
<td>Silicon Graphics</td>
<td></td>
<td>$1 million (licensing fee)</td>
<td>1</td>
<td>$1 million</td>
</tr>
<tr>
<td>Ramtron (20% stake)</td>
<td>Infineon</td>
<td>April 2001</td>
<td>$25.8 million ($129.1 million if 100% stake)</td>
<td>100</td>
<td>$1.29 million*</td>
</tr>
<tr>
<td>Tessera</td>
<td>Infineon</td>
<td>July 2006</td>
<td>$130 million (upfront + est. royalties for 6 years)</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Tessera</td>
<td>Qimonda</td>
<td>July 2006</td>
<td>$220 million (upfront + est. royalties for 6 years)</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
## Example Market Approach: Royalty Rate

<table>
<thead>
<tr>
<th>Licensor</th>
<th>Licensee</th>
<th>Technology</th>
<th>Royalty Base</th>
<th>Royalty Rates</th>
<th>Upfront Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credence Systems Corp.</td>
<td>Kinetix Test Systems, LLC</td>
<td>Automatic test equipment and all optional hardware and software related to use of the machines</td>
<td>Gross Revenue</td>
<td>3%</td>
<td>-</td>
</tr>
<tr>
<td>GateField Corp.</td>
<td>Rohm Co., Ltd.</td>
<td>ProASIC Technology related to a flash-based switching element and gate array-like ProASIC architecture</td>
<td>Gross Revenue</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>LAM Research Corp.</td>
<td>Tokyo Electron, Ltd.</td>
<td>AutoEtch technology and chamber design; LAM Plasma Etching Systems for Semiconductor Production</td>
<td>1%</td>
<td>1%</td>
<td>1.0%</td>
</tr>
<tr>
<td>LAM Research Corp.</td>
<td>Sumitomo Metal Industries, Ltd.</td>
<td>Rainbow single wafer etch systems</td>
<td>5%</td>
<td>5%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Ramtron Corp.</td>
<td>Racem Systems, Inc.</td>
<td>Thin-film ferroelectric technology with specific parameters used in the production of random access semiconductor memory devices</td>
<td>Net Sales</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Santa Claus 2000 SRL</td>
<td>Infinix Ventures, Inc.</td>
<td>Tunnelling magnetoresistance structure and the method of its production</td>
<td>Net Sales</td>
<td>10%</td>
<td>10.0%</td>
</tr>
<tr>
<td>SpeedFan Co., Ltd.</td>
<td>Far East Joint Venture</td>
<td>Thin-film technology related to chemical mechanical planarization used in the fabrication of semiconductor devices</td>
<td>Net Sales</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Synetrix Corp.</td>
<td>(various)</td>
<td>Ferroelectric random-access memory technology used in contactless smart cards</td>
<td>3%</td>
<td>3%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Taiwan Semiconductor Manufacturing Company</td>
<td>National Semiconductor Corp.</td>
<td>Advanced sub-micron processes for use in wafer fabrication</td>
<td>5%</td>
<td>5%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Trilogy, Ltd.</td>
<td>Control Data Corp.</td>
<td>Experimental wafer-scale integration technology</td>
<td>Sales</td>
<td>7%</td>
<td>7%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Royalty Rates</th>
<th>Average</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>4.4%</td>
<td>4.5%</td>
</tr>
<tr>
<td>High</td>
<td>4.7%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Mean</td>
<td>4.6%</td>
<td>4.5%</td>
</tr>
</tbody>
</table>
Shopped Term Sheets & Price Lists

- Term sheets not generally available, however over time licensing practitioner may be exposed to many of these.
- Price lists available e.g. Lucent, Intel, IBM
News Sources

- Licensing Economics Review (LER)
- Windhover Information (Windhover.com)
Journals, Proprietary Databases, Reports, Consultants

- Les Nouvelles- LES
  - http://www.lesi.org/lesnouvelles
- Journal of AUTM, AUTM data base
- Recombinant Capital-Recap.com (Mark Edwards)
- InteCap (Daniel McGavock) bought by CRA International
- Royaltysource.com
Published License Agreements

- Large population of published agreements
- DuPont’s license from the University of Houston on superconductor material
- Intuitive Surgical Inc. license from IBM for the use of an endoscope-SEC filing
Court Cases

## Exhibit 4.14  Case Law Sources of Royalties

<table>
<thead>
<tr>
<th>Product</th>
<th>Royalty</th>
<th>Date</th>
<th>Cite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotary Wing Aircraft</td>
<td>2%</td>
<td>1976</td>
<td>192 USPQ 612</td>
</tr>
<tr>
<td>Sleeping Bag</td>
<td>5%</td>
<td>1967</td>
<td>156 USPQ 403</td>
</tr>
<tr>
<td>Digital Data Transmitter</td>
<td>7.50%</td>
<td>1978</td>
<td>200 USPQ 481</td>
</tr>
<tr>
<td>Oscilloscope</td>
<td>10%</td>
<td>1977</td>
<td>193 USPQ 385</td>
</tr>
<tr>
<td>Computerized Teaching Aid</td>
<td>12%</td>
<td>1978</td>
<td>199 USPQ 178</td>
</tr>
<tr>
<td>Toilet Paper Perforator</td>
<td>20%</td>
<td>1977</td>
<td>195 USPQ 125</td>
</tr>
<tr>
<td>Airline Baggage Cart</td>
<td>100%*</td>
<td>1977</td>
<td>196 USPQ 129</td>
</tr>
</tbody>
</table>

*of profit  
Source: M. Michael Carpenter, Workshop at the 1979 LES Annual Meeting.
Lifetime and Organizational Learning

- One’s own experience and the accumulated experience at OTT over time
- Over 220 licenses executed by McGill of which over 150 are still active
Method 2.- Rating/ Ranking

- Sometimes called “factor analysis”
- Rating wrt benchmark reference
- 5 elements that comprise the rating/ranking method

1. Scoring criteria
2. Scoring system
3. Scoring scale
4. Weighting factors
5. Decision table
Scoring Criteria

- Market size, specifically the target market
- Product margins
- IP strength
- IP breadth
- Stage of development
- External environment trends
- Etc.
Scoring System

- 1 to 5 point system where 5=best, 1=worst and 3=equivalence to the reference or standard
- Likkert scale 1-7
- Metric mindsets 0-10
- Obsessive compulsives 0-100
Scoring Scales

- Subjective and objective
- Subjective- experts or expert panels- consensus or voting
- Objective- numerical scales derived from numerical examples- derived scales called “influence coefficients”
Weighting Factors

- Means of assigning a higher importance to some criteria and a lower importance to others
- Danger of counting same criteria multiple times e.g. market size, projected sales, likelihood of use in other applications, likelihood of sales in other countries....this is tantamount to counting market size 4 times
# Decision Table

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score (1-5)</th>
<th>Weight (1-3)</th>
<th>Weighted Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Market size</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>2. Product margins</td>
<td>5</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>3. IP strength</td>
<td>4</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>4. IP breadth</td>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>5. Stage of development</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>6. External environment</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>
Calculation

- Weighted score sum = 47
- Had all the scores been 3 (reference), the total would have been 42
- Subject opportunity is perceived to be $47/42 = 1.12$ or 12% better than the comparable
Method 3.- Rules of Thumb

- Deal equity considerations
  - Total value (or gain)
    - Cost savings or new product/service sales
  - Apportionment (or split)
    - 25% rule- 25% to seller/ 75% to buyer
  - Investment
  - Risk
Guidelines

- 25% of what?......
  - Cost savings attributed to the technology
  - New sales..... use EBIT

- Stacking- apportionment in the context of the enabling technologies
Method 4.- Discounted Cash Flow

- DCF method of valuing a license is similar to valuing companies and their stock
- NPV of all the future “free” cash flows from earnings
- RAHR decreases with time to reflect reduction in risk
## Risk Adjusted Hurdle Rate

<table>
<thead>
<tr>
<th>Characterization</th>
<th>RAHR %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk free, GIC, principle protected notes, ING savings</td>
<td>2-3</td>
</tr>
<tr>
<td>Very low risk, building a duplicate plant, existing product</td>
<td>WACC, 10-15%</td>
</tr>
<tr>
<td>Low risk, using well known technology for new product</td>
<td>20-30%</td>
</tr>
<tr>
<td>Moderate risk, technology improvements for new product</td>
<td>25-35%</td>
</tr>
<tr>
<td>High risk, new technology for new product to existing markets</td>
<td>30-40%</td>
</tr>
<tr>
<td>Very high risk, new technology for new product to new markets</td>
<td>35-45% +</td>
</tr>
<tr>
<td>Extremely high risk, “wildcatting” start-up company</td>
<td>50% +</td>
</tr>
</tbody>
</table>
Method 5.- Monte Carlo

- Refinement of the DCF method
- Probabilistic technique used extensively in engineering and business modeling in support of decision making
- Crystal Ball by Decisioneering Inc. at [www.decisioneering.com](http://www.decisioneering.com) (Oracle)
- @Risk by Palisade Corporation at [www.palisade.com](http://www.palisade.com)
Simulation Tools – Scenario Analysis

- Monte Carlo or probabilistic methods can be used to better understand the impact of uncertainty
  - A powerful simulation method when uncertainty of essential elements has an important impact on expected outcomes
  - A way of simulating a thousand commercial reruns and understanding the value and risks based upon a study of the outcomes

- Software tools:
  - @RISK
  - Decisioneering
How Monte Carlo Works....

- Instead of prescribing a specific value for a cell in a spreadsheet model, prescribes a mathematical model of reality
- Probabilistic because it is based on a prescribed randomness or distribution
Prescribed Distributions

- Normal
- Triangular
- Uniform
- Lognormal
Probability Distrib. to Model Key Assumptions

**Uniform Distribution**
- **Testing Costs**
- Equal likelihood along a range

**Normal Distribution**
- **Market Penetration**
- Normally distributed around a value

**Triangular Distribution**
- **Marketing Costs**
- More likely toward the higher end of the range

**Custom Distribution**
- 25% chance: −15% to −5%, and 75% chance: 0% to 5%
An Example

[Image of a histogram showing the distribution of total remediation cost, with a peak at $9,004 and a certainty of 80.13%.]
Method 6.- Auctions

- Auctioning and Industry Standards method based on direct market determinations
- Industry Standards method based on previous transactions similar to..
- Auction Method uses existing and pending offers for precisely the technology being valued
- Because buyers are at a disadvantage, requires special circumstances to induce prospective buyers to “play”
Auctions Are Feasible When....

- The bargaining power of the seller is high
- The technology can be apprehended quickly
- Due diligence is straightforward and clear
- Licensing opportunity is so compelling that passing it up is worse than bidding
- High competitive rivalry