Treasures in the Attic
How much is that IP worth?

FICPI World Congress Toronto - June 5-10, 2018
Wednesday, June 6 – Break out 4.1
Introduction

• Thank you for attending: complex topic.

• Our goal today: be practical, manipulate numbers, present case studies.

• Relevant speakers: with various and complementary experiences.

• Organization of the session
Outline of the presentation

• Introduction - by Anne Levy, Partner Brandon IP
• Presentation of the speakers
  – Elise Deliau, Consultant, Brandon Valorisation (FR)
  – Dr. Moonkyo Chung, Deputy Senior Director, Korea Technology Finance (KR)
• Why carry out a valuation study?
• Business cases:
  – The need for a detailed demonstration – by Brandon
  – Kibo’s model and DCF Case Study
  – Brandon’s calculation model
• Conclusion by Anne Levy
• Q & A
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• Conclusion by Anne Levy

• Q & A
Ms Elise Deliau

• Background:
  – Master’s degree in management & finance from the European Business School
  – IP development consultant especially in charge of patent financial valuation
  – 8 years experience in SMEs strategic advice

• Brandon Valorisation key drivers:
  – Set up in 1991
  – To provide entrepreneurs with solutions suitable to their development issues “from and through” innovation
  – Making IP an income stream vs. a cost center
  – Leveraging economic development through innovation & IP valuation and management
  – Delivering high quality services thanks to a small team entirely dedicated to its clients
Ms Elise Deliau

- Our expertise:
  
  Financial valuation: how much is this patent worth?
  
  Business diversification: looking for patents open to license
  
  Technology transfer and licensing

Brandon Valorisation
Innovation et Propriété Industrielle

ACTING FOR THE IP PROFESSION WORLD WIDE
Ms Elise Deliau

• What Brandon Valorisation does in terms of IP financial valuation:
  – A unique method based on 25 years of experience
  – Relying on a strong qualitative and financial demonstration
  – Validated with accountants and financial investors
  – Mainly for start-ups and SMEs, accompanied in their business and IP strategy from the very beginning of their activity
  – Estimated IP value: from 400 K€ to 18 500 K€
Ms Elise Deliau

- Our clients:
Dr. Moonkyo Chung

- Background:
  - PhD in Physics from the University of Kentucky (USA)
  - Postdoc in Physics from Clemson Univ. (USA) and POSTECH (Korea)
  - Senior researcher at Korea Institute of Science and Technology (KIST)
    (Research field : CDW, Superconductor, thermal & optical material design)
  - Working as a Deputy senior director in Seocho branch of Kibo, mainly responsible for technology appraisal guarantee.
  - Experience in defining, developing, implementing, and monitoring the technology appraisal models in Kibo
  - Specializes in the valuation of advanced and novel technologies (IP),
  - 8 years experience in R&D and 18 years experience in technology appraisal and guarantee service for innovative SMEs
Dr. Moonkyo Chung

• Kibo key drivers
  - Founded in 1989
  - 68 branches, 1,206 employees
  - Foundation purposes
    ① to facilitate the financing of new technology business and further to contribute to the development of national economy by establishing & developing technology credit guarantee system.
    ② to provide debt guarantee for companies that are not financially strong enough to afford collateral to facilitate financing.
Dr. Moonkyo Chung

- Technology guarantee service
### Dr. Moonkypo Chung

- **Technology appraisal system**

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Type</th>
<th>Results</th>
</tr>
</thead>
</table>
| - guarantee  
- certificate  
- tech. business feasibility | - KTRS(general), KTRS-SM (start-up), KTRS-BM(revenue)  
- R&D, cultural contents service, green tech, climate tech  
- 1-man creative, young-generation startup, pre start-up | scores, rating, ranking |

<table>
<thead>
<tr>
<th>Tech. rating/ranking</th>
<th>IP valuation</th>
</tr>
</thead>
</table>
| - investment in kind  
- collateral value of IP  
- transfer of technology (IP) | - income approach  
(DCF+TF, S/W, Dynamic)  
- market approach  
(Relief-from royalty)  
- cost approach |

- monetary value
Dr. Moonkyo Chung

• Performance of technology appraisal guarantee (y2017)

Amount of guarantee
- Cumulative balance: B$20.5
- Newly provided: B$0.6
- # of SMEs guaranteed: 61,288

Technology appraisal cases
- Total # of cases: 55,087 cases
- # of IP valuation: 1,095 cases (cumulative #: 7,581 cases)
- Amount of guarantee by IP valuation: B$0.734

Default & claim right
- Default amount: B$0.88
- Default rate: 4.4%
- Indemnity right balance: B$1.89
- Indemnity right collected: B$0.22
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• Conclusion by Anne Levy
• Q & A
Why carry out an IP valuation study?
Why carry out an IP valuation study?

• Assessing the value of the company: fundraising, capital opening operation, transfer of shares to the staff
• Capital contribution
• Preparing a joint venture
• In case of litigation
• In case of patent sell-off or licensing
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The need for a detailed demonstration

<table>
<thead>
<tr>
<th>Patented manufacturing process</th>
<th>Customized cosmetic formulation</th>
<th>Owned by a project holder</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Objective**
- To calculate the value of the patent
- In view of contributing to the capital of the company
- Preparing a fundraising at the same time

**What we’ll look at**
- What are the key drivers of a relevant IP valuation?
- Focus on the demonstration: how does the product meet its market
- Calculation

**Scope of the study**
- Scope of application: a specific segment of the cosmetic industry
- Area of the Study: Europe and USA
Key drivers of a successful IP valuation study

**What?**
To assess at which price a potential acquirer would buy the IP title.

**How?**
To demonstrate that the IP right is able to meet its market and has a market value:

- A strong (not long) market study, including market trends, consumer habits, competitors, standards and rules
- An IP right quality analysis
- A fine analysis of the patented technology: what makes it different from existing processes or products?
- To compare the technology economic forecasts to the market metrics
How to: market study

To customize a relevant market study:

- Comparable or competing technologies
  - Customizing - makeup simulation and virtual make-up - determining skin characteristics
- Consumer trends
  - Digital beauty / customization / key influencers
- Market features and size
  - Maturity & growth of cosmetics market
  - Internet weight increase
  - Price positioning of cosmetics products
  - Market size assessment
- Standards and regulation
  - Not a key factor on this subject – briefly mentioned
How to: IP quality

• To evaluate the quality of the patent:
  – Written by an IP attorney who didn’t work on the patent application
• To explain the value of the patent regarding its legal and technical characteristics:
  – Sufficiency of the description
  – Novelty
  – Inventive step
  – And any factor which may affect its value, especially opposition proceedings and litigation.
How to: product analysis

To customize the product analysis according to the market and the technology

<table>
<thead>
<tr>
<th>Products marketed from the patent and related know-how</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Certain sorts of personalized cosmetics, ordered via an online or mobile app,</td>
</tr>
<tr>
<td>• Wide range of versions possible,</td>
</tr>
<tr>
<td>• Customer’s modus operandi for ordering the product.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Production line</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Industrial partnership</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marketing strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Throughout social networks and influencers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Market positioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Recap of the differentiation drivers and positioning, depending on the market; here: luxury houses.</td>
</tr>
</tbody>
</table>
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Kibo’s IP valuation model

- Income approach based on DCF+TF

\[
\text{IP Value} = \left[ \frac{f_{cf_1}}{(1+r)^1} + \frac{f_{cf_2}}{(1+r)^2} + \frac{f_{cf_3}}{(1+r)^3} + \ldots + \frac{f_{cf_N}}{(1+r)^N} \right] \times TF
\]

\[
= \left[ \sum_{t=1}^{N} \frac{f_{cf_t}}{(1+r)^t} \right] \times TF
\]

where
- N is the economic life time of the technology (IP)
- \( f_{cf_t} \) free cash flow at a time t
- r is the discount rate
- TF is a technology factor, degree contributed by the tech. asset
IP Valuation procedure

**Analysis/Assessment**
- Technology(IP) prospect
  - technology trend
  - technology competitiveness
  - IP quality, etc
- Market prospect
  - market trend
  - market environment, etc
- Commercial feasibility
  - product competitiveness
  - marketing strategy
  - profit forecast, etc

**Modeling/Estimation**
- N = f(TCT, technology & market attributes)
- fcf = NOPLAT \cdot
  + depreciation – capex
  – working capital
- r = WACC’
  = k_d \times (1 - \tau) \times \left( \frac{D}{E+D} \right) + k_e \times \left( \frac{E}{E+D} \right)
- TF = [Industrial technology element] \times [Individual technology strength]

**Calculation**
- IP Value
  = \left[ \sum_{t=1}^{N} \frac{f_{cf_t}}{(1+r)^t} \right] \times TF

*NOPLAT : Net Operating Profit Less Adjusted Tax
** WACC’ : modified Weighted Average Cost of Capital*
Case study

- **Overview of valuation**
  - Company S (founded in 2004, ~120 employees)
  - Purpose of valuation: to finance for commercializing the patented product micro-channel condenser
  - Invention name: Manufacturing method of a condenser for air conditioning (IPC: F28F, Industry: C29176(heat exchange in machinery industry))
  - Patent #: KR 10-1540071
  - Date filed: Jan. 27, 2015
    → Date being expired: Jan. 27, 2035
  - Registration date: July 20, 2015
  - Date valued: Sept. 30, 2016
Case study

- Technology competitiveness

  - Able to manufacture multiple micro channel condensers at one time
  → Increase productivity and decrease cost
  - Used for refrigerator, air-conditioner, water purifier, vending machine, etc

<Fig. 1> Production process of micro channel condensers

<Fig. 2> Mechanism of refrigerator
Case study

• Market Trend
  - Product: micro-channel condenser for refrigerator, air conditioner, etc.
  - Market size

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global market</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># of refrigerators (in 1000)</td>
<td>106,180</td>
<td>109,760</td>
<td>112,670</td>
<td>115,690</td>
<td>119,150</td>
</tr>
<tr>
<td># of air conditioner (in 1,000)</td>
<td>121,940</td>
<td>128,650</td>
<td>134,870</td>
<td>141,920</td>
<td>149,370</td>
</tr>
<tr>
<td>Total # of production (in 1,000)</td>
<td>228,120</td>
<td>238,410</td>
<td>247,540</td>
<td>257,610</td>
<td>268,520</td>
</tr>
<tr>
<td>Micro-channel condenser (in B$)**</td>
<td>1.49</td>
<td>1.56</td>
<td>1.62</td>
<td>1.69</td>
<td>1.76</td>
</tr>
<tr>
<td><strong>Korea market</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># of refrigerators (in 1000)</td>
<td>31,854</td>
<td>32,928</td>
<td>33,801</td>
<td>34,707</td>
<td>35,745</td>
</tr>
<tr>
<td># of air conditioner (in 1,000)</td>
<td>36,582</td>
<td>38,595</td>
<td>40,461</td>
<td>42,576</td>
<td>44,811</td>
</tr>
<tr>
<td>Total # of production (in 1,000)</td>
<td>68,436</td>
<td>71,523</td>
<td>74,262</td>
<td>77,283</td>
<td>80,556</td>
</tr>
<tr>
<td>Micro-channel condenser (in M$)**</td>
<td>448</td>
<td>468</td>
<td>486</td>
<td>506</td>
<td>527</td>
</tr>
</tbody>
</table>

* Korea market size (mainly produced by LG, Samsung Electronics) is 30% of world market
** Selling price : 7,000₩/ea
*** Exchange rate: 1,069.1 ₩/$ used
(1) Economic Life Time of Technology (IP)

- Defined as
  - A period to keep the competitiveness of business using the underlying technology or a future time that a technology loses its competitive advantages in the market resulting from negative factors taking place

- TCT (Technology Cycle Time)
  - Index to denote speed in change of technology group that the given IP belongs to, using statistically analyzed data (Q1, Q2, Q3, average, median, etc) of yearly citation frequency over the years

- Economic life time (N)
  - N = f(TCT, technology attribute, market attribute)
IP Valuation

• Example of TCT (626 IPCs DB)

<table>
<thead>
<tr>
<th>IPC</th>
<th>Description</th>
<th>Avg.</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>F28F</td>
<td>general heat exchange or details of heat transfer</td>
<td>11.23</td>
<td>5</td>
<td>9</td>
<td>15</td>
</tr>
</tbody>
</table>

• Economic life time (N)
  - \( f(\text{TCT}, \text{technology attribute}, \text{market attribute}) \)

<table>
<thead>
<tr>
<th>Type</th>
<th>Attribute</th>
<th>w.f.</th>
<th>very low</th>
<th>low</th>
<th>normal</th>
<th>high</th>
<th>very high</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>Possibility to appear to replace the technology</td>
<td>7</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Technology</td>
<td>Technological superiority</td>
<td>5</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Technology</td>
<td>Existence of similar competitive technology</td>
<td>4</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>Possibility to imitate</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Technology</td>
<td>Range of patent right</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Market</td>
<td>Market concentration &amp; Market competitiveness</td>
<td>8</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market</td>
<td>Change in market competitiveness</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Market</td>
<td>Potential market share</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market</td>
<td>Frequency of new products</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum (in points)</td>
<td></td>
<td>130</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acquired score (in %)</td>
<td></td>
<td>63.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ \text{Acquired score} = \left( \frac{130}{205} \right) \times 100 \]
IP Valuation

- Calculation of the economic life time of the technology

$$Economic \ life \ time \ of \ the \ technology = f(TCT, \ Technology \ factors, \ Market \ factors)$$

$$= Q_2 + (Q_3 - Q_2) \times \frac{acquired - basis}{maximum - basis} (if \ acquired \geq basis)$$

Where

- Q1, Q2, Q3 : 1st, 2nd, 3rd quarter of TCT distribution which is given by IPC look-up table
- maximum = 100 pts, basis = 60 pts
- acquired score is obtained by tech/market assessment

For example,

for IPC = F28F,

- Q1=5, Q2=9, Q3=15,
- acquired score=63.4%

Economic life time (N) = 9 + (15-9) (63.4-60)/((100-60)

\(\Xi\ 10 \text{ years}\)
IP Valuation

(2) Free cash flow

• Defined as

\[ \text{fcf} = \text{NOPLAT} \times (\text{revenues} - \text{sales cost} - \text{selling & management cost} - \text{tax}) + \text{Depreciation} - \text{Capital expenditure} - \text{Working capital} \]

* NOPLAT : Net Operating Profit Less Adjusted Tax
### IP Valuation

**Forecast of future revenues**

<table>
<thead>
<tr>
<th>year</th>
<th>1st yr</th>
<th>2nd yr</th>
<th>3rd yr</th>
<th>4th yr</th>
<th>5th yr</th>
<th>6th yr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>quantity</td>
<td>sales</td>
<td>quantity</td>
<td>sales</td>
<td>quantity</td>
<td>sales</td>
</tr>
<tr>
<td>Buyer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>500</td>
<td>3,500</td>
<td>700</td>
<td>4,900</td>
<td>700</td>
<td>4,900</td>
</tr>
<tr>
<td>G</td>
<td>-</td>
<td>-</td>
<td>300</td>
<td>2,100</td>
<td>800</td>
<td>5,600</td>
</tr>
<tr>
<td>M</td>
<td>-</td>
<td>-</td>
<td>33</td>
<td>233</td>
<td>200</td>
<td>1,400</td>
</tr>
<tr>
<td>H</td>
<td>-</td>
<td>-</td>
<td>67</td>
<td>467</td>
<td>400</td>
<td>2,800</td>
</tr>
<tr>
<td>Total</td>
<td>500</td>
<td>3,500</td>
<td>1,100</td>
<td>7,700</td>
<td>2,100</td>
<td>14,700</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>year</th>
<th>7th yr</th>
<th>8th yr</th>
<th>9th yr</th>
<th>10th yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>33,957</td>
<td>36,606</td>
<td>39,461</td>
<td>42,539</td>
</tr>
</tbody>
</table>

(Assumed 7.8% (CAGR of global heat exchange market) growth rate after 6th year)
## IP Valuation

### Fee cash flow

(单位: M₩)

<table>
<thead>
<tr>
<th></th>
<th>1st yr</th>
<th>2nd yr</th>
<th>3rd yr</th>
<th>4th yr</th>
<th>5th yr</th>
<th>6th yr</th>
<th>7th yr</th>
<th>8th yr</th>
<th>9th yr</th>
<th>10th yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>3,500</td>
<td>7,700</td>
<td>14,700</td>
<td>20,300</td>
<td>26,600</td>
<td>31,500</td>
<td>33,957</td>
<td>36,606</td>
<td>39,461</td>
<td>42,539</td>
</tr>
<tr>
<td>Sales cost*</td>
<td>2,821</td>
<td>6,205</td>
<td>11,847</td>
<td>16,360</td>
<td>21,437</td>
<td>25,386</td>
<td>27,366</td>
<td>29,500</td>
<td>31,802</td>
<td>34,282</td>
</tr>
<tr>
<td>S&amp;M cost*</td>
<td>500</td>
<td>1,100</td>
<td>2,101</td>
<td>2,901</td>
<td>3,801</td>
<td>4,501</td>
<td>4,852</td>
<td>5,231</td>
<td>5,639</td>
<td>6,079</td>
</tr>
<tr>
<td>EBIT</td>
<td>179</td>
<td>394</td>
<td>753</td>
<td>1,039</td>
<td>1,362</td>
<td>1,613</td>
<td>1,739</td>
<td>1,874</td>
<td>2,020</td>
<td>2,178</td>
</tr>
<tr>
<td>Tax**</td>
<td>19</td>
<td>64</td>
<td>143</td>
<td>206</td>
<td>277</td>
<td>332</td>
<td>360</td>
<td>390</td>
<td>422</td>
<td>457</td>
</tr>
<tr>
<td>NOPLAT</td>
<td>159</td>
<td>329</td>
<td>609</td>
<td>832</td>
<td>1,084</td>
<td>1,279</td>
<td>1,378</td>
<td>1,483</td>
<td>1,597</td>
<td>1,720</td>
</tr>
<tr>
<td>Depreciation</td>
<td>62</td>
<td>222</td>
<td>374</td>
<td>447</td>
<td>466</td>
<td>466</td>
<td>466</td>
<td>466</td>
<td>466</td>
<td>466</td>
</tr>
<tr>
<td>Capex</td>
<td>1,249</td>
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<td>Working capital</td>
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<td>885</td>
<td>1,475</td>
<td>1,180</td>
<td>1,327</td>
<td>1,032</td>
<td>517</td>
<td>558</td>
<td>601</td>
<td>648</td>
</tr>
<tr>
<td>Investment recovered</td>
<td></td>
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<td>FCF</td>
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<td>714</td>
<td>1,327</td>
<td>1,392</td>
<td>1,463</td>
<td>11,263</td>
</tr>
</tbody>
</table>

(* sales cost: 80.59%, selling & management cost 14.29% of sales assumed (average cost rate in the same industrial field (C291))

**(Korea corporate tax rate: 11% for less than 200M₩, 22% for more than 200M₩)
IP Valuation

(3) Discount rate (r)

- Defined as

\[ r = WACC' = k_d' \times (1 - \tau) \times \left( \frac{D}{E+D} \right) + k_e' \times \left( \frac{E}{E+D} \right) \]

where

- \( k_d' = \overline{k}_d + \text{risk spread} \), \( \overline{k}_d \): average cost of debt capital of the same industry

- \( k_e' = [R_f + \beta \times (E(R_m) - R_f)] + \text{size premium + commercialization premium} \)

(average cost of equity capital of the same industry)

- Estimated by appraiser

- \( E \): Equity capital, \( D \): Debt capital
**IP Valuation**

- **Look-up table of $k'_e$ and $k'_d$** (96 industries DB)

<table>
<thead>
<tr>
<th>Industry code</th>
<th>Cost of equity $k'_e$</th>
<th>%equity $E/(E+D)$</th>
<th>Cost of debt $k'_d$</th>
<th>%debt $D/(E+D)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>listed</td>
<td>listed</td>
<td>Listed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>big</td>
<td>big</td>
<td>Big</td>
<td></td>
<td></td>
</tr>
<tr>
<td>medium</td>
<td>medium</td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>small</td>
<td>small</td>
<td>Small</td>
<td></td>
<td></td>
</tr>
<tr>
<td>start-up</td>
<td>start-up</td>
<td>Start-up</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Industry code | 29 (machinery) | 5.35% | 5.76% | 6.20% | 6.71% | 7.42% | 53.96% | 3.87% | 7.41% | 8.78% | 10.31% | 14.37% | 46.04% |

- **Commercialization premium**

<table>
<thead>
<tr>
<th>Appraisal element</th>
<th>Score</th>
<th>Appraisal element</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology risk</td>
<td></td>
<td>Commercialization risk</td>
<td></td>
</tr>
<tr>
<td>Differentiation</td>
<td>4</td>
<td>Time required to commercialize</td>
<td>5</td>
</tr>
<tr>
<td>Technology competitiveness</td>
<td>4</td>
<td>Market growth</td>
<td>3</td>
</tr>
<tr>
<td>Possibility to imitate</td>
<td>4</td>
<td>Market competitiveness</td>
<td>3</td>
</tr>
<tr>
<td>Stability of patent right</td>
<td>4</td>
<td>Market penetration</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Productivity</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Profitability</td>
<td>3</td>
</tr>
</tbody>
</table>

**Acquired score:** Commercialization risk premium 38 pts : 2.71%

- **Calculation of $r$**

\[
r = 8.78 \times (1-0.20345) \times 46.04\% + (6.20+2.71) \times (53.96\%) = 8.03\%
\]

\[
k'_d \times (1 - \tau) \times \left( \frac{D}{E+D} \right) \quad k'_e \times \left( \frac{E}{E+D} \right)
\]
(4) Technology Factor (TF)

- Originally developed by
  - Dow Chemical Company, supported by Arthur D. Little consulting firm
  - later extended and refined by Dr. Sam Khoury, CEO of Inavisis

- Defined as
  - $TF = \text{Industrial technology element} \times \text{Individual technology strength}$
    - Industrial technology element
      - $= \text{intangible asset ratio} \times \text{technology asset ratio}$
    - (upper limit for the contribution of a certain technology)
    - (asset’s strength and weakness determined by the competitive and utility categories)
IP Valuation

- Industrial technology element (DB of 72 different industries)

<table>
<thead>
<tr>
<th>Industrial code</th>
<th>Intangible asset ratio</th>
<th>Technology asset ratio</th>
<th>Industrial technology element</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 (machinery)</td>
<td>59.03%</td>
<td>98.96%</td>
<td><strong>58.42%</strong></td>
</tr>
</tbody>
</table>

- Individual technology strength (input by appraiser)

<table>
<thead>
<tr>
<th>Competitive attribute</th>
<th>Score</th>
<th>Utility attribute</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation</td>
<td>4</td>
<td>Time required to commercialize</td>
<td>5</td>
</tr>
<tr>
<td>Differentiation (Uniqueness)</td>
<td>4</td>
<td>Capital required to commercialize</td>
<td>3</td>
</tr>
<tr>
<td>Replacement</td>
<td>3</td>
<td>Productivity</td>
<td>4</td>
</tr>
<tr>
<td>Imitation</td>
<td>4</td>
<td>Economic life time</td>
<td>4</td>
</tr>
<tr>
<td>Range of right</td>
<td>3</td>
<td>Market demand</td>
<td>4</td>
</tr>
<tr>
<td>Stability of right</td>
<td>4</td>
<td>Market penetration</td>
<td>4</td>
</tr>
<tr>
<td>Usability</td>
<td>4</td>
<td>Potential market share</td>
<td>3</td>
</tr>
<tr>
<td>Prospect</td>
<td>4</td>
<td>Sale growth</td>
<td>3</td>
</tr>
<tr>
<td>Impact</td>
<td>4</td>
<td>Profitability</td>
<td>3</td>
</tr>
<tr>
<td>Obsolescence</td>
<td>3</td>
<td>By product sales</td>
<td>3</td>
</tr>
</tbody>
</table>

| subtotal of competitive    | **37** | subtotal of utility                    | **36** |

- Calculation of TF : TF = 58.42%*73 pts = **42.65** (in %)
IP Valuation

• Summary of estimated parameters for DCF+TF method
  - $N = 10$ years  ($<18$ years which is remaining period of time legally protected by the patent)
  - $r = 8.03\%$
  - $TF = 42.65\%$
### Calculation of IP value

(Units: million KRW)

<table>
<thead>
<tr>
<th></th>
<th>year 1</th>
<th>year 2</th>
<th>year 3</th>
<th>year 4</th>
<th>year 5</th>
<th>year 6</th>
<th>year 7</th>
<th>year 8</th>
<th>year 9</th>
<th>year 10</th>
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</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>3,500</td>
<td>7,700</td>
<td>14,700</td>
<td>20,300</td>
<td>26,600</td>
<td>31,500</td>
<td>33,957</td>
<td>36,606</td>
<td>39,461</td>
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<tr>
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<td>2,820</td>
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<td>27,365</td>
<td>29,500</td>
<td>31,801</td>
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<td>1,100</td>
<td>2,100</td>
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<td>3,801</td>
<td>4,501</td>
<td>4,852</td>
<td>5,231</td>
<td>5,638</td>
<td>6,078</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Corporate tax</td>
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<td>1,950</td>
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<td>0</td>
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<td>1,180</td>
<td>1,327</td>
<td>1,032</td>
<td>517</td>
<td>558</td>
<td>601</td>
<td>648</td>
</tr>
<tr>
<td>capital (D)</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
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<td>1,180</td>
<td>1,327</td>
<td>1,032</td>
<td>517</td>
<td>558</td>
<td>601</td>
<td>648</td>
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<tr>
<td>fcf (F)</td>
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<td>-2,283</td>
<td>-1,581</td>
<td>-279</td>
<td>223</td>
<td>714</td>
<td>1,327</td>
<td>1,392</td>
<td>1,463</td>
<td>11,263</td>
</tr>
<tr>
<td>(F=A-B-C-D+E)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Coeff. of PV (G)</td>
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<td>0.8568</td>
<td>0.7931</td>
<td>0.7342</td>
<td>0.6796</td>
<td>0.6291</td>
<td>0.5823</td>
<td>0.539</td>
<td>0.499</td>
<td>0.4619</td>
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<td>Present Value (H)</td>
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<td></td>
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</tr>
<tr>
<td>(H=F×G)</td>
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<td>-1,956</td>
<td>-1,254</td>
<td>-205</td>
<td>152</td>
<td>449</td>
<td>772</td>
<td>750</td>
<td>730</td>
<td>5,202</td>
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<td>Tech Factor (J)</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>42.65%</td>
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<td>Tech. Value (K)</td>
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~1 million US$
### Patent ledger after providing guarantee

<table>
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<th>특허등록번호</th>
<th>10-150071-0000 (patent #)</th>
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<tr>
<td>권리관</td>
<td>(Area for patent right)</td>
</tr>
<tr>
<td>표시번호</td>
<td>사항</td>
</tr>
</tbody>
</table>

| (date filed) | 출원일: 2015년 01월 27일 | 출원번호: 10-2015-0012808 |
| (registration date) | | |
| 1년 | 특허결정(선출)일: 2016년 07월 26일 | 정구범위의 항수: 5 |
| (Invention name) | (IPC) 유형: F28F 0013 |
| | 발명명: 공조용 충격기 제조 방법 |
| | 존속기간(예정)면료일: 2035년 01월 27일 |
| | 2015년 07월 22일 등록 |

### 특허권자 관 (Area for patent owner)

<table>
<thead>
<tr>
<th>순위번호</th>
<th>사항</th>
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<tbody>
<tr>
<td>(등록권리자)</td>
<td>(owner of patent)</td>
</tr>
<tr>
<td>(주)삼일산업사</td>
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</tr>
<tr>
<td>광주광역시 광산구...</td>
<td></td>
</tr>
<tr>
<td>김영전</td>
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<tr>
<td>광주광역시 광산구...</td>
<td></td>
</tr>
<tr>
<td>2015년 07월 22일 등록</td>
<td></td>
</tr>
</tbody>
</table>

### (Registration of the pledge right)

| 등록 의무자: (주)삼일산업사 | (debtor: company S) |
| | 광주광역시 광산구... |
| 등록 권리자: 기술보증기금 (회금접: 광주기술평가센터) | (creditor: Kibo) |
| 부산광역시 남구... |
| 채권 액: 금1,080,000,000원 | (claim amount: ~$1M) |
| 변제기: |
| 등록 원인: 설정계약 |
| 존속기간: |
| 2016년 12월 05일 등록 |
Kibo’s concluding remarks

• Kibo developed its own IP valuation model
  - Established many useful database for IP valuation, such as bibliographic patent data (IPC vs. Q1,Q2,Q3), corporate’s financial data with industries, technology & market data, etc.
  → Make IP valuation relatively easy & fast and reliable

• Provide financial benefits to innovative SMEs
  - 1,095 cases, $271M provided to SMEs using IP valuation in year 2017

• Create new business related to IP
  - University technology holdings company (set up by patent investment-in kind by University)
  - Research based company (set up by matching patent investment-in kind by research institute and cash investment by private enterprise
Outline of the presentation

• Introduction
• Presentation of the speakers
  – Elise Deliau, Consultant, Brandon Valorisation (FR)
  – Dr. Moonkyo Chung, Deputy Senior Director, Korea Technology Finance (KR)
• Why carry out a valuation study?
• Business cases:
  – The need for a detailed demonstration – by Brandon
  – Kibo’s model and DCF Case Study
  – Brandon’s calculation model
• Conclusion by Anne Levy
• Q & A
Key drivers of a successful IP valuation study

What? To assess at which price a potential acquirer would buy the IP title.

How? To demonstrate that the IP right is able to meet its market and has a market value:

A strong (not long) market study, including market trends, consumer habits, competitors, standards and rules

An IP right quality analysis

A fine analysis of the patented technology: what makes it different from existing processes or products?

To compare the technology economic forecasts to the market metrics
How to: market forecasts

- **Time**
  - How long will the technology last before becoming obsolete?
  - About 5 years

- **Volumes**
  - How many pieces sold per year?
    - From 9K to 180K units, increasing over the period

- **Prices**
  - Which selling price? Cost price? gross margin?
    - 100 $ - 30$ - 67% of turnover

- **Operating expenses**
  - What are the operating expenses (staff, office rent, etc.)?
    - Here, from 900k$ to 6,000 k$

- **Margin**
  - What is the operating income before tax?
    - Negative at the beginning, around 36% of TO at the end of the period
### How to: market forecasts

<table>
<thead>
<tr>
<th>In k$ (except unit prices in $)</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traded volumes</td>
<td>9,000</td>
<td>18,000</td>
<td>45,000</td>
<td>90,000</td>
<td>180,000</td>
</tr>
<tr>
<td>Unit selling price (pre-tax)</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Unit cost price (pre-tax)</td>
<td>33</td>
<td>33</td>
<td>33</td>
<td>33</td>
<td>30</td>
</tr>
<tr>
<td>Turnover</td>
<td>900</td>
<td>1,800</td>
<td>4,500</td>
<td>9,000</td>
<td>18,000</td>
</tr>
<tr>
<td>Growth rate</td>
<td>100%</td>
<td>150%</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Cost of goods sold</td>
<td>297</td>
<td>594</td>
<td>1,485</td>
<td>2,970</td>
<td>5,400</td>
</tr>
<tr>
<td>Gross margin</td>
<td>603</td>
<td>1,206</td>
<td>3,015</td>
<td>6,030</td>
<td>12,600</td>
</tr>
<tr>
<td>Gross margin rate</td>
<td>67%</td>
<td>67%</td>
<td>67%</td>
<td>67%</td>
<td>70%</td>
</tr>
<tr>
<td>Other operating expenses</td>
<td>900</td>
<td>1,200</td>
<td>3,000</td>
<td>3,700</td>
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<tr>
<td>EBITDA</td>
<td>-297</td>
<td>6</td>
<td>15</td>
<td>2,330</td>
<td>6,600</td>
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<tr>
<td>EBITDA rate</td>
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<td>0%</td>
<td>0%</td>
<td>26%</td>
<td>37%</td>
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<tr>
<td>Amortization</td>
<td>90,000</td>
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<td>90</td>
<td>120</td>
<td>120</td>
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<td>EBIT rate</td>
<td>-43%</td>
<td>-5%</td>
<td>-2%</td>
<td>25%</td>
<td>36%</td>
</tr>
</tbody>
</table>

**EBIT : earnings before interest and tax = result**
How to: value calculation

At this stage, it’s time to:

- Sum up the major factors driving the patent value
- Setting up the gross value of the patent
- Sum up the reduction factors
- Setting up the net value

Life expectancy of the invention: 5 years
Cosmetics market specificities
Differentiating features of the invention: personalization, unique products, trends, luxury

Percentage of the cumulated EBIT, usually between 3% and 10%.
8 %

High competition, recency/youth of the patent, industrial risks
25% of the gross value

Gross value minus reduction rate
489 k$

EBIT: earnings before interest and tax = result
How to: value calculation

Focus on the calculation

<table>
<thead>
<tr>
<th>In K$</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIT</td>
<td>-387</td>
<td>-84</td>
<td>-75</td>
<td>2,210</td>
<td>6,480</td>
</tr>
</tbody>
</table>

- Cumulated EBIT: 8,144
- Gross value: 8% → 652
- Rate of reduction: 25% → 163
- Net Value: 489

EBIT: earnings before interest and tax = result
How to: value calculation

• Details regarding the method of calculation:
  – Brandon uses a method based on the forecast of future revenues
  – Other methods are:
    • Discounted cashflows – not used because of:
      – The lack of comparable data regarding innovations at the beginning of their life cycles
      – Little in common with listed companies whose metrics will be used in DCF methods
    • Expected royalties – not used because of:
      – Strong variability of royalty rate, generating high gaps in the value appreciation
      – Difficulty getting reliable data regarding royalty rates for comparable patents
Brandon’s concluding remarks

• Brandon’s method for IP valuation study:
  – Based on a strong demonstration that the technology is able to meet its clients.
  – Always accepted and validated by the accountants and/or financial investors of our clients.
Outline of the presentation

• Introduction
• Presentation of the speakers
  – Elise Deliau, Consultant, Brandon Valorisation (FR)
  – Dr. Moonkyo Chung, Deputy Senior Director, Korea Technology Finance (KR)
• Why carry out a valuation study?
• Business cases:
  – The need for a detailed demonstration – by Brandon
  – Kibo’s model and DCF Case Study
  – Brandon’s calculation model
• Conclusion by Anne Lévy
• Q & A
To sum up

A few things to keep in mind:

• 2 different approaches to value IP rights that have both been proven as relevant
• Quantitative analysis alone is insufficient.
• Good IP valuation is finding the right balance.
• Mix of skills and components: legal analysis, economic analysis, market research.
• Rigor, demonstration and consistency are keywords!

CET8 is currently drafting a best practice guide on IP Valuation for FICPI members. Should be ready for circulation next year.
Outline of the presentation

• Introduction by Anne Levy, Partner Brandon IP
• Presentation of the speakers
  – Elise Deliau, Consultant, Brandon Valorisation (FR)
  – Dr. Moonkyo Chung, Deputy Senior Director, Korea Technology Finance (KR)
• Why carry out a valuation study?
• Business cases:
  – The need for a detailed demonstration – by Brandon
  – Kibo’s model and DCF Case Study
  – Brandon’s calculation model
  – Conclusion by Anne Levy
• Q & A
Thank you for your attention

Q & A