Valuing Disruptive and Emerging Technology Investments: Perspectives

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Discussion Outline

- Definitions and Characteristics
- Valuation Considerations
- Valuation Methods
- Case studies
- Practical Considerations
- Summary

Disruptive Technologies: Some Definitions adapted from The Innovator's Dilemma by Prof: Clayton Christensen

- A disruptive technology emerges. Cannot initially match the performance of the existing incumbent technology.

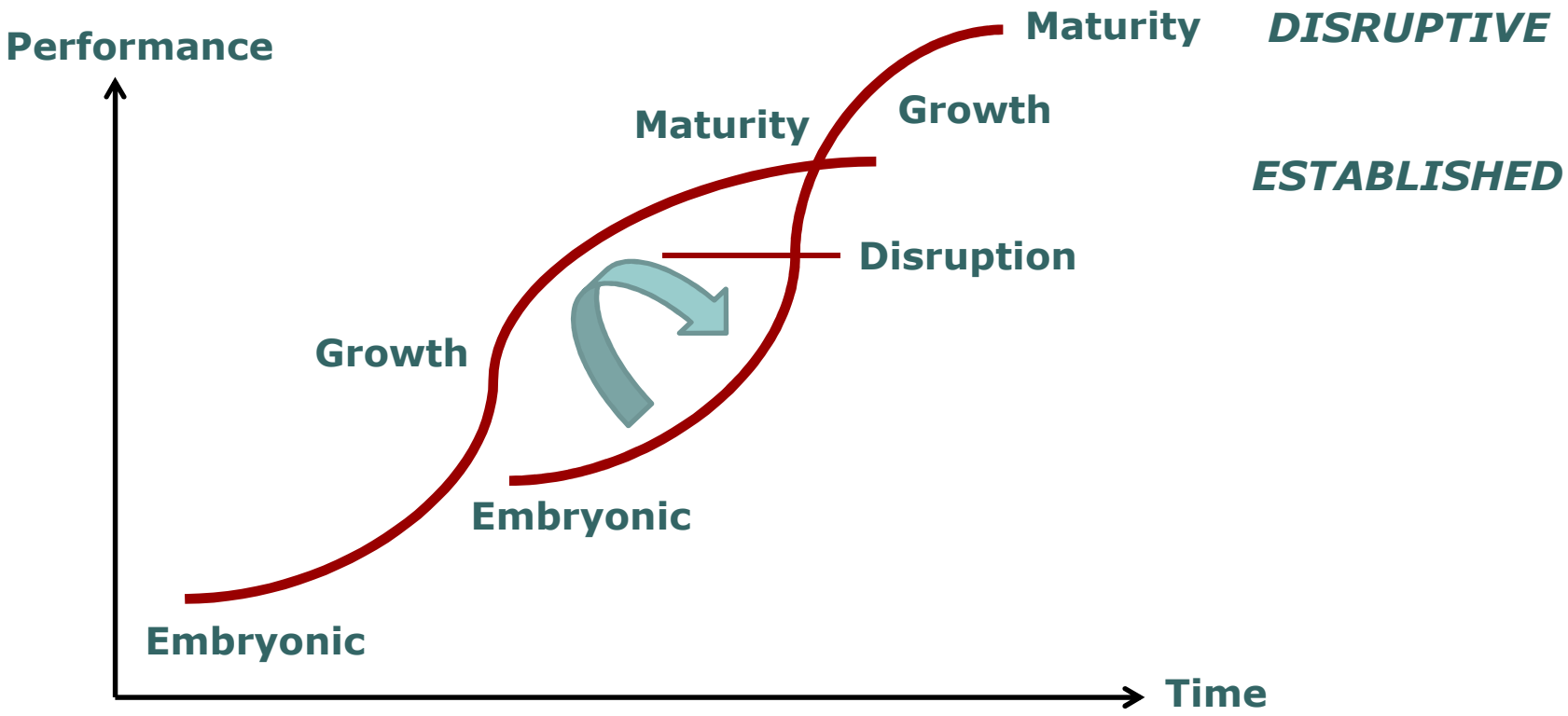
- Disruptive technology is initially valued by a small segment of customers, and increasing numbers of new customers.

- Incumbent players in the market conclude that investment in the disruptive technology is irrational.

Characteristics

- **Normally result in worse performance, at least in the near term.**
- **Bring a different value proposition to the market than what had been available previously. Are generally cheaper, simpler, smaller, and more convenient to use.**
- **Are usually commercialised in emerging or insignificant markets.**
- **Established firms' leading customers generally don't want, or can't use, a disruptive technology at first. They may later accept such technology as an extension.**

Disruptive technologies could complement / replace existing technologies over time



Some Examples

- **Biotechnology and pharmaceuticals**
- **Social networks**
- **Stem Cell Research**
- **Tata Industries: Nano – low cost automobiles**
- **More …**

Possible Applications

- **Capital Allocation**
- **Strategic Acquisitions / Share Allotments**
- **Venture Capital Investment**
- **Intellectual Property Valuations**

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Valuation Considerations

- **What is the status of development and acceptance?**
- **Are the risk characteristics the same as an existing business?**
- **What is the market expectation and appetite for the solution provided by such technology? Now? In the future?**
- **What are the associated risks? What are relevant industry parameters?**
- **How long will it take to commercialise this technology?**
- **Who are the possible competitors?**
- **What are some comparable or reference investments? What is their story?**

Valuation Methods

- **Changing from Objective to Subjective and Probable Means which reflect industry experience**
- **Reflect industry and strategic investor views**
- **Some approaches:**
  - **Customer Focused Measures**
  - **Probabilistic Methods**
  - **Real Option approaches**

Customer Focused Measures

- Future cost to acquire a customer
- Future cost to support a customer
- Future cost of a repeat customer
- Size of market in future
- Ability to acquire target market in future

Probabilistic Methods

- **r NPV**
- **Conjoint Probability Approach - Consequence Based**
- **Survival / Success Based Discount Rate**
- ***Other simulation and probabilistic methods***

r NPV: Biopharmaceutical Application

- Includes costs and risks of clinical trials and approvals
- Costs based on phase, number of patients, cost per patient
- Income based on total assessed market x market penetration (potentially high)

r NPV: Biopharmaceutical Application

	Time (in Years)	*Probability*		*Value*	*Risk adjusted value*	*Present value of risk adjusted values*
Payoff	8	20%		$ 900,000,000	$ 180,000,000	$ 58,842,319
		Likelihood that product will reach market	**Probability of product reaching market at end of respective phase**		`	
Costs		***Ro***	***Ri***	***Value***	***Risk adjusted value***	
Phase 1	1	20%	20%	$ 500,000	$ 500,000	$ 434,783
Phase 2	2	20%	40%	$ 2,500,000	$ 1,250,000	$ 945,180
Phase 3	6	20%	65%	$ 15,000,000	$ 4,615,385	$ 1,995,358
Support studies for phase 2	2	20%	30%	$ 1,000,000	$ 666,667	$ 504,096
FDA Filing	8	20%	81%	$ 1,500,000	$ 370,370	$ 121,075
Sum of risk adjusted costs					***$ 7,402,422***	***$ 4,000,491***
Risk adjusted value					***$ 172,597,578***	***$ 54,841,828***

Discount rate 15%

Note Ri is dependent on nature of development - e.g. monoclonal, protein, etc

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Compound Probability: Technology Application

Observed EBITDA multiples for listed liquid stocks		7.00	Based on market research		
DLOM		20.00%			
Post tax discount rate		17.50%			
Specific risk premium		8.00%			
Venture Capital approach (4 year basis)					
Year		**2008**	**2009**	**2010**	**2011**
EBITDA		-0.4	0.4	10.0	24.8
Individual Probability		90.0%	90.0%	70.0%	60.0%
Conjoint probability (function of previous year)		90.0%	81.0%	56.7%	34.0%
Exit multiple					5.6
EV					**47.32**
Discount rate	36.43%				
PV		**13.66**			
Venture Capital Approach (3 year basis)					
Year		**2008**	**2009**	**2010**	
EBITDA		**-0.4**	**0.4**	**10.0**	
Individual Probability		0.9	0.9	0.7	
Conjoint probability (function of previous year)			0.81	0.567	
Exit multiple				5.6	
EV				**31.89**	
Discount rate	36.43%				
PV		**12.56**			

Success / Failure Based Discount Rate

- Risks reflected in discount rates
- Applied to projected cash flows
- Recognises probability of IP succeeding in future
- Aim to overcome issues with existing discount rate models:
  - Probability of IP succeeding
  - Holding period of IP investment

Success / Failure Based Discount Rate

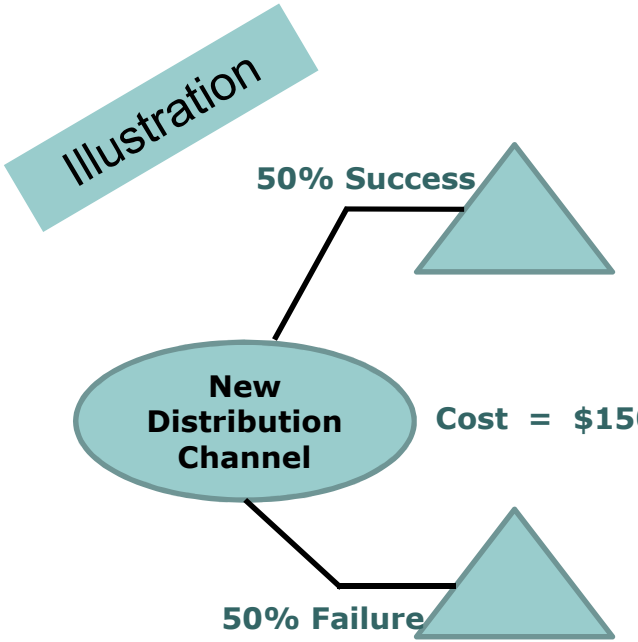
- Example:
  - Investment = $1 million
  - Target Rate of Return = 20%
  - Holding Period = 5 years
  - Anticipated Success Rate = 20%

$$(1+\text{Hurdle rate})^{\text{Holding period}} = \left((1+\text{Investor Target rate})^{\text{Holding period}}\right) \Big/ \text{Anticipated success rate}$$

Applying the above values results in a value of 65.57%

Real Options

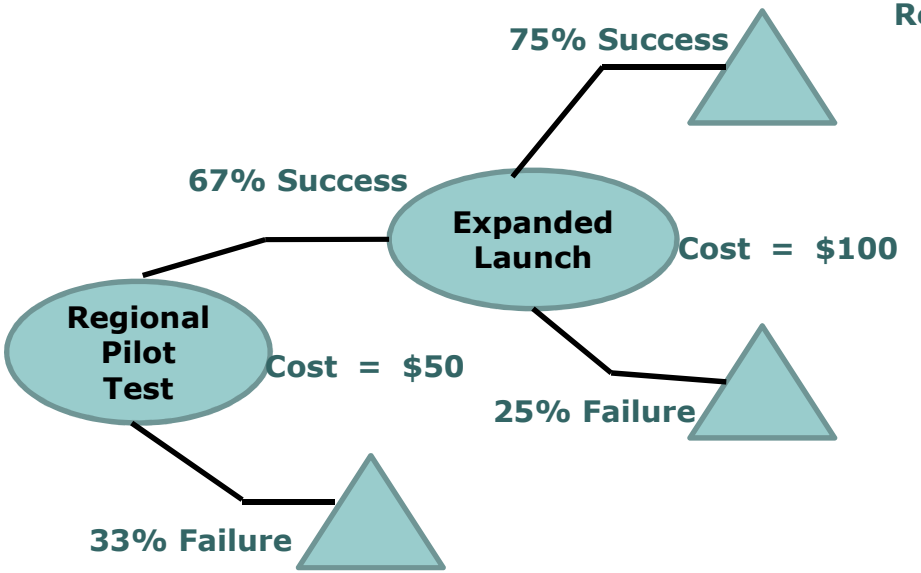
- A 50 percent chance of success for this new distribution channel



	Revenue	Profit		Probability		Expected Payoff
50% Success	$400	$250	X	0.50	=	$125
50% Failure	$0	($150)	X	0.50	=	($75)
						Expected Value $50

Real Options

- A 50 percent chance of success, but the analysis captures the value inherent in staging the investment and increases flexibility value



	Revenue	Profit		Probability		Expected Payoff
	$400	$250	X	0.50	=	$125
	$0	($150)	X	0.17	=	($26)
	$0	($50)	X	0.33	=	($16)
						Expected Value $83

Value of option =$33

Practical Considerations

- **Which Standard of value to apply**
- **Risk adjusted cash flows or adjusted discount rate**
- **Watch out for potential double counting of risks**
- **Comparable data for companies and sector (volatility, success rates)**
- **Is market data reliable or comparable?**
- **Time to market and payoffs**
- **Aligning valuation methods to industry measures**

Summary

- **Evolving field**
- **Research emphasis and classification**
- **Industry considerations and benchmarks**
- **Aligning method to technology and development status**
- **Does it make sense!!!**
- **People and their commitment!!!**

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Comments, questions and ideas?!!

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THANK YOU!!

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