We will begin momentarily…

Improving Success In Collaborative R&D
By Selecting an Optimal Alliance Governance Structure and Partner Type

This paper extends the study of alliance governance structure design by examining what alliance structure, coordination mechanisms and partner type best promote the likelihood of Research and Development (R&D) success or performance.

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Improving Success in Collaborative R&D by Selecting an Optimal Alliance Governance Structure and Partner Type

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Contents

1. Research Background

Why Pharmaceutical R&D is increasingly in alliances:

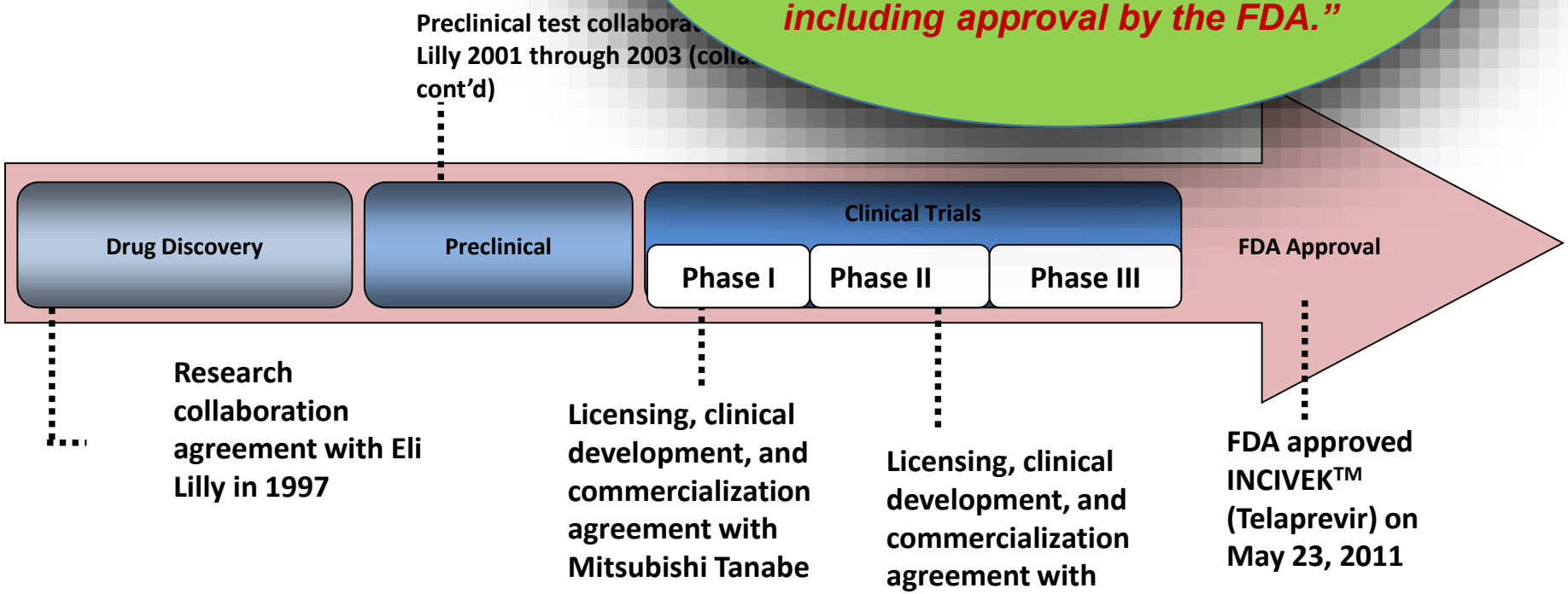
- Sources of knowledge more widely scattered
  - Over firms
  - Across nations
- Different Scientific disciplines (e.g., Genomics, Physiology, Biochemistry, etc.)
- Different therapeutic areas (e.g., Oncology, Gastroenterology, Hematology, Immunology, Nephrology, Neurology, etc.)
- No single firm encompasses all fields
- Most pharmaceutical R&D does not result in commercialization
- Big-pharma business is risky (like buying lottery tickets)
- "Big Pharma" often has "dry pipelines" relying only on in-house research
- Hence R&D alliances with nimble biotech partners.
- No longer enough to categorize alliances as
  - Equity vs. Non-equity
- Need to go beyond the superficial classifications

1. Research Background

- **The Protracted and Fragment… Alliances**

FIGURE 1: An Illustratio…

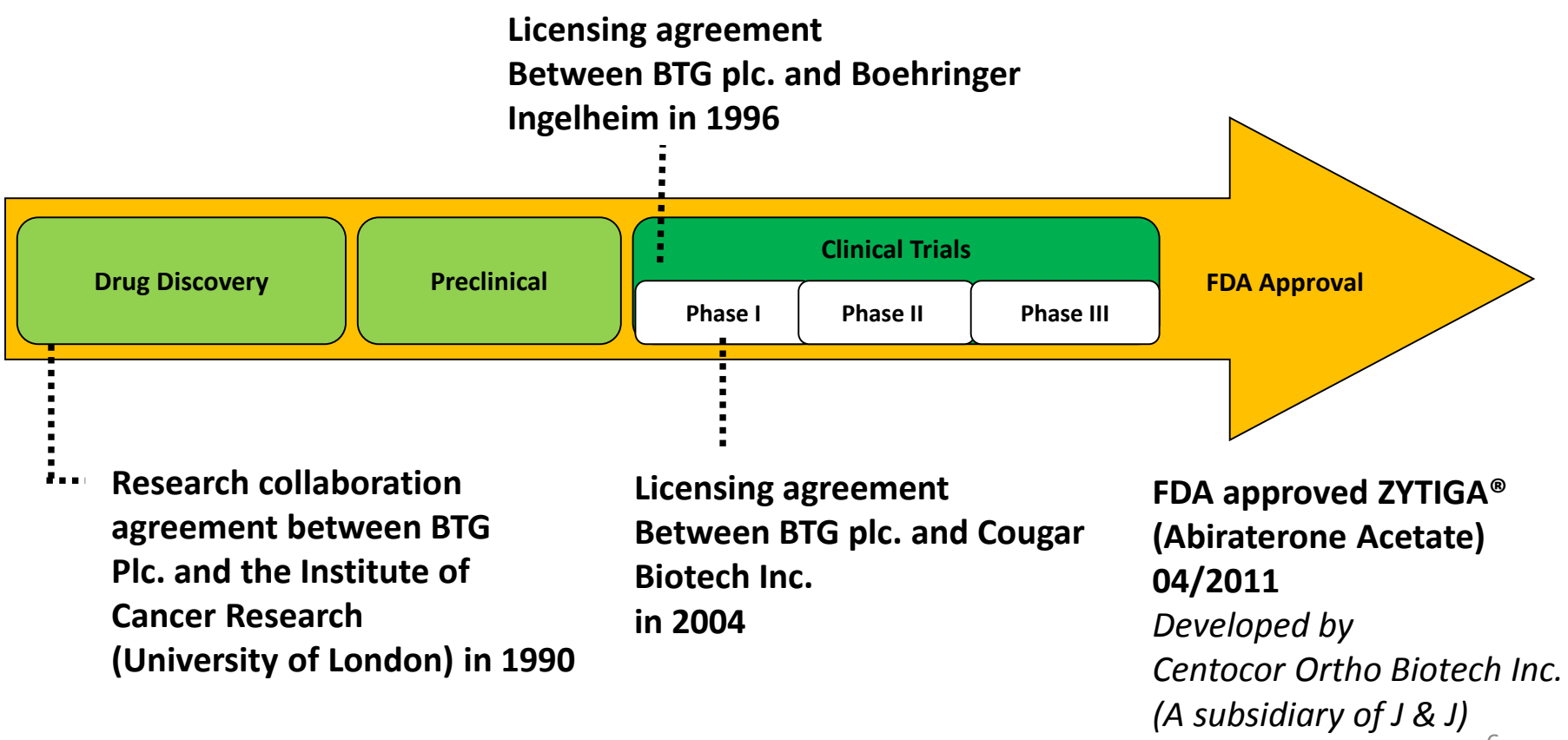
Excerpted from the 10-K report of Vertex Pharmaceuticals Inc. (2007):
"We have limited experience in conducting and managing the late-stage clinical trials necessary to obtain regulatory approvals, including approval by the FDA."



1. Research Background

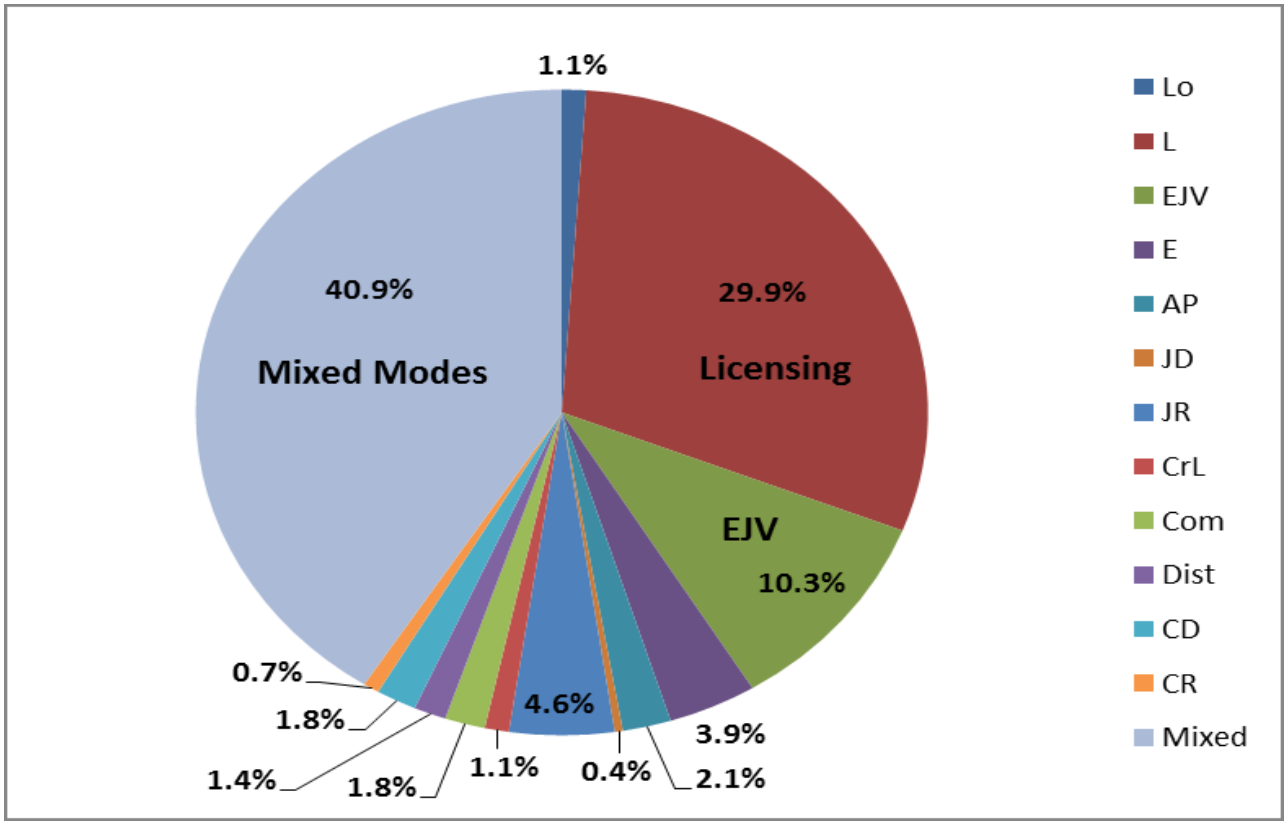
- **The Protracted and Fragmented Nature of Bio-Pharmaceutical Research Alliances (cont'd)**

FIGURE 2: An example of hypothesis-based clinical trial



1. Research Background

- **Multiple Elements in Alliance Agreements**



Recap Data: Pharmaceutical alliances 2000 ~ 2003

Loan (**Lo**): 1.1%; Licensing (**L**): 29.9%; Equity Joint Venture (**EJV**): 10.3%; Equity (**E**): 3.9%; Asset Purchasing (**AP**): 2.1%; Joint-Development (JD): 0.4%; Joint Research (JR): 4.6%; Cross-Licensing (**CrL**): 1.1%; Commercialization (**Com**): 1.8%; Distribution (**Dist**): 1.4%; Contract Development (**CD**): 1.8%; Contract Research (**CR**): 0.7%; Mixed modes (**Mixed**): 40.9%

2. Introduction

- R&D alliances with diverse partners (e.g., universities, research institutes, contract research organizations and biotech-pharma) at any stages in R&D are very common.

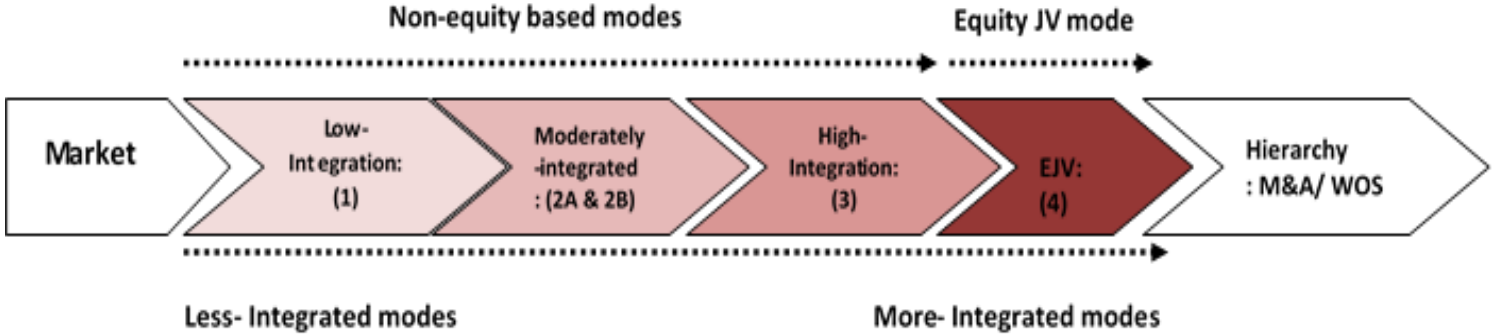
- Alliance contracts have become more complex
- Focus more on alliance details and structure to coordinate multiple tasks with a partner

- Using detailed contract provisions, allies
  - ***Govern inter-partner collaboration***
  - ***Stipulate responsibilities and roles***
  - ***Have options to flexibly respond to emerging contingencies***

- An effective level of integration promotes inter-partner interaction and knowledge-sharing activity ***(Hoetker &Mellewigt, 2009)***

2. Introduction

- ***Key Questions for Alliance Negotiators***
- What is the optimal degree of interaction between the allies?
  - How **"Tight an Embrace"** between the partners?
  - How **complex or detailed** should the agreement be?
  - How much **partner interaction** should be specified in negotiating the agreement?
- No longer enough to categorize alliances as
  - Equity vs. Non-equity
- Need to go beyond this bi-modal classification
- Because there is an entire range or spectrum of governance or inter-partner interaction alternatives:



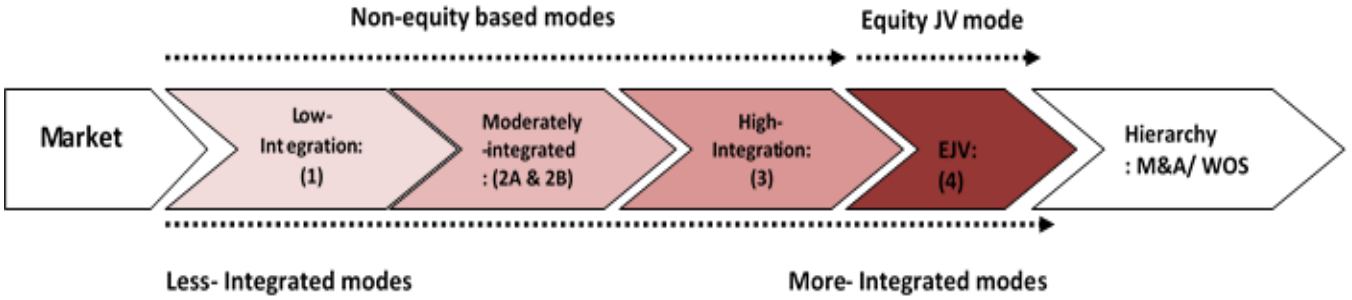
2. Introduction

- Need to examine the actual structure of the alliance and details of inter-partner interactions
- All alliances (including EJVs) these days have a long agreement that specifies details such as
  - CONTRIBUTIONS
    - IP
    - Personnel
    - Finance and other assets
  - RIGHTS
    - Fruits of R&D (How split or shared?)
    - Patents
    - Territory
    - Product Scope
  - SAFEGUARDS
    - Monitoring
    - Joint governance (Joint Steering Committee) / participation
    - Veto powers

Determinants of R&D alliance governance mode choice

Dependent Variable

Rising Level of Overall Interaction Between the Partners



Independent Variables

1) **Differences Between Home Countries of Allies**

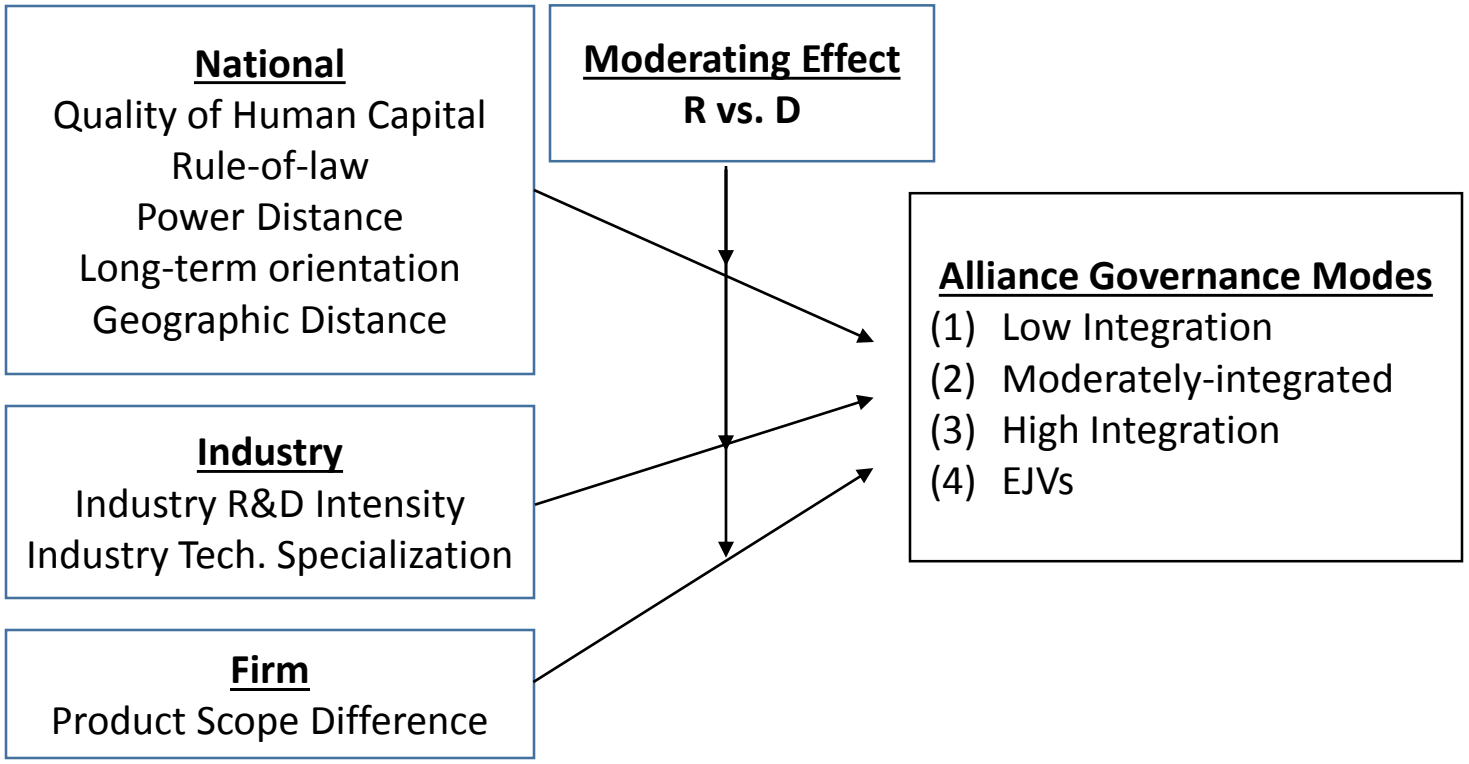
- *Human Capital*
- *Rule of Law*
- *Power Distance*
- *Long Term Orientation*
- *Geographical Distance*

2) **Technical and Product Differences Between Partners**

- *R&D Intensity*
- *Industry technical Specialization*
- *Product Scope Differences*

Model

- Using the new governance mode classification as dependent variable, we examine the following model



- Using a data from the biopharmaceuticals (US SIC: 2833~2836) during 2000~2003, we performed an Ordinal Logistic Regression

Hypotheses

TABLE 1: HYPOTHESIS		RESULT
H1	The greater the difference in **the quality of human capital** of the home nations of the allies, the lower the likelihood of using a more integrated alliance mode. Moreover, this negative relationship will be even stronger when the R&D is in the **development** phase rather than the research phase.	Partial Support
H2	As the difference between the nations of the allies increases, in terms of **institutional factors such as the rule of law**, there will be a greater likelihood of using a more integrated alliance mode. And this positive relationship will be even stronger when the R&D is in the **development** phase rather than the research phase.	Supported
H3A	As **cultural difference in power distance** between partnering firms increases, the likelihood of using a more-integrated alliance mode will decrease. Moreover, this negative relationship will be stronger for R&D in the **development** phase rather than in the research phase.	Supported
H3B	As **cultural difference in long-term orientation** between partnering firms increases, the likelihood of using a more-integrated alliance mode will decrease. Moreover, this negative relationship will be stronger for R&D in the **development** phase rather than in the research phase.	Partial Support

Hypotheses (cont'd)

TABLE 1: HYPOTHESIS (cont'd)		RESULT
H4	As **geographic distance** between partner firms increases, the likelihood of using a more-integrated alliance mode is increased. And this positive relationship will be stronger for R&D in the **research** phase rather than in the development phase.	Supported
H5A	As the gap between allies in **Industrial R&D intensity** increases, the likelihood of using a more-integrated alliance mode will decrease. And this negative relationship will be stronger for joint work in the **development** phase rather than in the research phase.	N.S.
H5B	As the gap between allies in **Industrial technology specialization** increases, the likelihood of using a more-integrated alliance mode will decrease. And this negative relationship will be stronger for joint work in the **development** phase rather than in the research phase.	Partial Support
H6	As the **Product scope or Sub-sectoral Difference** between allies increases, the likelihood of using a more-integrated alliance mode will decrease. And this negative relationship will be stronger in the **development** phase than in the research phase.	Partial Support

Method

- **Data and Sample**

  - Current Agreement Database

  - All Alliances announced in between 2000 and 2003 in the Pharmaceutical industry (US SIC: 2833 ~ 2836)

  - Sample: 237 alliances

- **Variables**

  (1) Dependent Variables: Degree of Overall Integration (or Alliance Governance Modes)

  Low-Integration "1" < Moderately-Integrated "2" < High-Integration "3" < EJV "4"

  Ranking Ordered: Ordinal Logistic Regression

  Difference measurement formula: $\sum_{i=1}^{4} \{(\text{Index}_{iX} - \text{Index}_{iY})^2 / V_i\} / 4$

Results

- **Ordinal Logistic Regression (full sample 237 used)**

Variables *(Variables for hypotheses indicate difference between partnering firms; e.g., difference in power distance)*	Model 1: Controls (Sample A)	Model 2: Country-factors (Sample A)	Model 3: Industry-factors (Sample A)	Model 4: Firm-factor (Sample A)
AGE Difference	0.373 (.031)	0.036 (.032)	0.031 (.032)	0.032 (.032)
SIZE Difference	0.017 (.028)	0.025 (.029)	0.012 (.033)	0.008 (.030)
Alliance Experience	-0.376 (.396)	-0.380 (.343)	-0.351 (.354)	-0.355 (.356)
University	-3.540 (.992)***	-3.502 (.908)***	-3.371 (.874)***	-3.323 (.887)***
Research Institute	-0.504 (.438)	-0.591 (.556)	-0.448 (.543)	-0.392 (.554)
Quality of Human Capital (H1)		-0.062(.037)*	-0.068 (.041)*	-0.066 (.042)*
Rule-of-Law (H2)		0.399 (.262)*	0.111 (.256)	0.108 (.258)
Power Distance (H3A)		-0.560 (.300)**	-0.484 (.277)*	-0.487 (.278)*
Long-Term Orientation (H3B)		-0.238 (.118)**	-0.149 (.124)	-0.149 (.123)
Geographic Distance (H4)		0.002 (.000)***	0.001 (.000)**	0.001 (.000)**
Industrial R&D intensity (H5A)			0.078 (.062)	0.076 (.062)
Industrial Technology Specialization (H5B)			0.299 (.213)	0.296 (.211)
Product Scope Difference (H6)				-0.976 (.874)
-2 Log likelihood	511.121	500.656	498.021	497.025
Chi-square	31.98***	46.27***	48.91***	49.91***
Cox and Snell R-square	0.126	0.177	0.186	0.190
Number of observations	237	237	237	237

Results (cont'd)

- **Ordinal Logistic Regression**

(with samples in Research "B" and samples in Development "C")

Variables *(Variables for hypotheses indicate difference between partnering firms; e.g., difference in power distance)*	Model 5 (Sample B)	Model 6 (Sample C)
AGE Difference	0.018 (.035)	0.274 (.115)**
SIZE Difference	0.040 (.031)	-0.025 (.058)
Alliance Experience	-0.442 (.412)	-0.374 (.561)
University	-2.974 (.837)***	-16.991 (1.28)
Research Institute	-0.574 (.602)	0.686 (.100)
Quality of Human Capital (H1)	-0.071 (.041)*	-0.068 (.151)
Rule-of-Law (H2)	-0.330 (.338)	3.134 (1.488)**
Power Distance (H3A)	-0.491 (.292)	-1.373 (.673)**
Long-Term Orientation (H3B)	-0.058 (.195)	-0.232 (.241)
Geographic Distance (H4)	0.001 (.000)**	-0.000 (.000)
Industrial R&D intensity (H5A)	0.024 (.081)	0.024 (.145)
Industrial Technology Specialization (H5B)	0.652 (.275)	-1.372 (.561)**
Product Scope Difference (H6)	0.175 (1.032)	-3.206 (1.718)*
-2 Log likelihood	320.894	151.679
Chi-square	43.39***	21.83**
Cox and Snell R-square	0.224	0.250
Number of observations	161	76

Findings

(1) The likelihood of using a **more-integrated alliance mode** decreases as the difference between nations of alliance partner firms increases in terms of **human capital and cultural distance**

(2) Greater **geographic and institutional environment** (e.g., rule-of-law) difference is positively related with the choice of **more-integrated** alliance governance modes (followed by KBV and TCE perspectives)

(3) But firms in **research stage** (rather than development) are more likely to choose a **more-integrated alliance mode** when there is greater geographic distance

(4) And firms in **development stage** are more likely to use **less-integrated modes** when they face greater cultural, industrial and technological base difference

Conclusions

(1) Negotiators designing alliance agreements need to think about "how tight an embrace" they wish to have between the partners.

(2) This research has provided an approach to thinking about this issue in two dimensions

- Degrees/Directionality of interactions between the allies (no-way; one-way and two-way)
- Number of deal elements and length of agreement

(3) The overall degree of desirable integration between partners depends on

- Country differences between partners
- Industry technological specialization
- Product scope or sub-sectoral differences

Next to Part 2 of Our Research

Overall Question

How does the success (or "performance") of a bio-pharmaceutical R&D project depend on the design of the alliance agreement

2. Introduction

- ***Negative Aspects*** of detailed (complex) contract and increased inter-partner interaction for complex (multi-task) alliances

  However, greater frequency of interaction and complex coordination in contractual alliances, or culminating in a hierarchical structure (e.g., EJV) can

  - Increase ***bureaucratic costs***
  - Increase ***information processing costs***
  - Increase the ***initial investment***

Objective: What alliance governance structure helps balance the benefits and costs side of interaction and coordination, and then best promotes the likelihood of successful R&D performance?

2. Introduction

- **Optimal communication and coordination** positively affects alliance performance
  (Gulati and Singh, 1998; Poppo and Zenger, 2002)

- **Moderating effects of Partner Diversity**

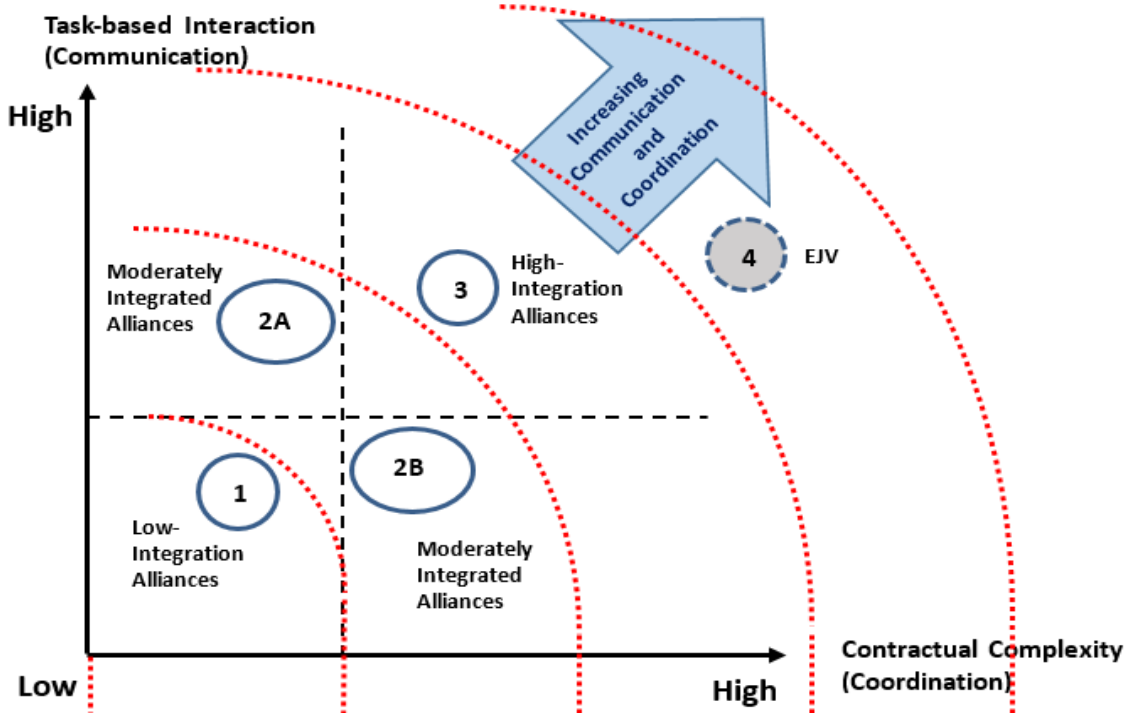
  (i) Organizational Diversity (Universities, research institutes or contract research organizations vs. firms)

  (ii) Technological Base Diversity between alliance partners

3. Theory & Hypotheses

- **Hypothesis**

  (1) ***R&D alliance structure and performance (a base model)***



- Increasing interaction and more detailed contracts enhance tacit knowledge transfer and promote common understanding of technology

- But too much detail, joint tasks, and bureaucracy - beyond an optimal level - can increase information-processing costs and technology appropriation difficulties

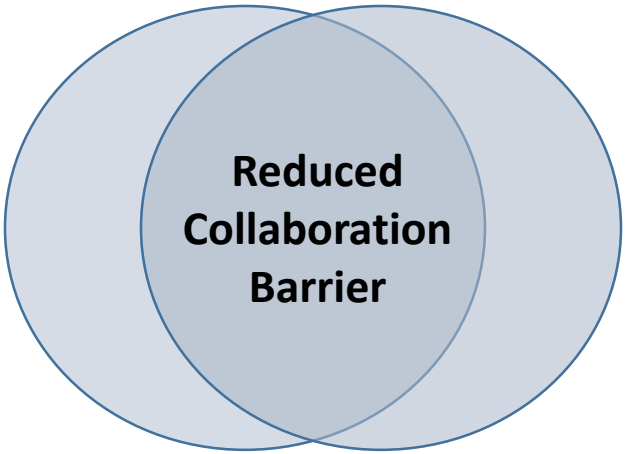
H1: *The likelihood of successful R&D alliance performance will be highest for those R&D alliances adopting a governance mode with a moderate or intermediate degree of overall communication and coordination*

3. Theory & Hypotheses

- **Hypothesis**

  (2) *Moderating Effects of Partner Diversity*

  - Greater **Organizational Diversity** (universities, research institutes or contract research organizations vs. Others)



- Opportunism/ Uncertainty and Unintended knowledge spillover greatly REDUCED
- Tend not to directly compete
- Pool diverse knowledge sources for innovation

H2: *Organizational diversity in R&D alliances (e.g., those with a university, (non-profit) research institute or CRO) positively moderates the curvilinear relationship between the successful alliance performance and the overall degree of coordination and communication in a given R&D alliance mode*

3. Theory & Hypotheses

- **Hypothesis**

  (2) *Moderating Effects (cont'd)*

  - **Technological Base Diversity:** Partners with distinct/idiosyncratic technologies can promote R&D performance

  - Similar domains of technology: Miscommunication, information-processing costs can be reduced. But there will be a **weak synergetic effect**

  - Too much unique/idiosyncratic technology: **Not automatically complement**

H3: *The earlier posited curvilinear relationship between the alliance performance and the overall degree of coordination and communication in a given R&D alliance mode will be positively moderated by a moderate degree of technological base diversity between allies.*

4. Methods

- **Sample and Data**
  - Alliances announced in between 2000 and 2004 in the Biopharmaceutical industry (US SIC: 2833 ~ 2836)
  - Sample: 269 (initially 357) alliances
  - Current Agreement Database

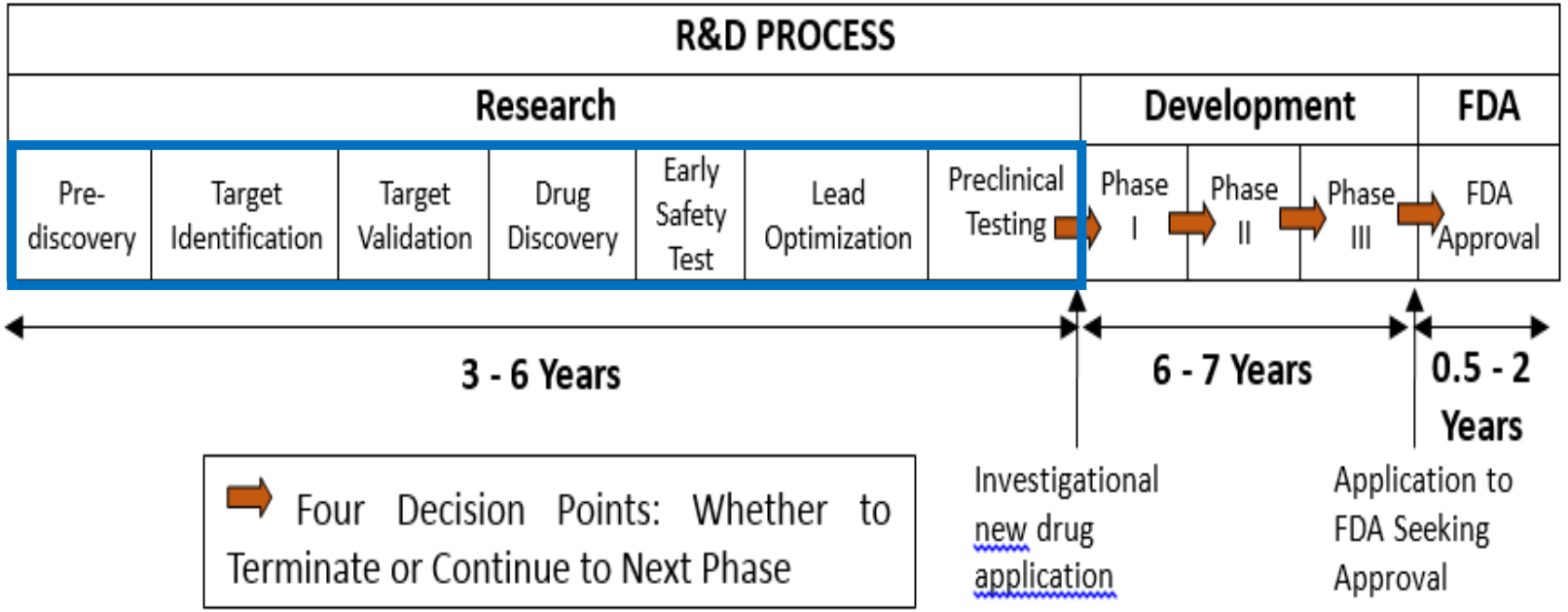
- **Dependent Variable**
  - ***'Successful R&D Alliance Performance' :*** measures whether a particular phase of R&D was followed by a decision to proceed to the next stage (i.e., "Success" coded as '1' and otherwise as '0')

  - Binary Logistic Regression analysis

4. Methods

- **Dependent Variable (cont'd)**

Pharmaceutical R&D Process and Four Decision Points



4. Methods

- **Main Independent Variables**

  '*The Overall Degree of Communication and Coordination' (ODCC)* in a given alliance:

  Four Part Classification Based on Discriminant Analysis
  Low integration (1), Moderately integrated (2), High integration (3), and Equity Joint Ventures (4)

- **Independent Variables (cont'd)**

  - Organizational Diversity: Alliances with (non-profit) Universities, Research Institutes or Contract Research Organizations '1' and '0' for otherwise

  - Technology Base Diversity: Number of commercialized drugs in specific therapeutic classes (USC 3- Uniform System of Classification by IMS Health)

$$\textit{Technological Base Diversity} = 1 - \frac{T_i T_j'}{\sqrt{(T_i T_i')(T_j T_j')}}$$

Typical Deal Components in Agreements

Contractual Provisions / Ingredients

I.	***Asset Purchase (AP)***
II.	***Contract Development (CD)***
III.	***Contract Research (CR)***
IV.	***Cross-Licensing (CrL)***
V.	***Passive Equity Purchase (E)***
VI.	***Joint Development (JD)***
VII.	***Joint Research (JR)***
VIII.	***License (L)***
IX.	***Loan (Lo)***
X.	***Manufacturing (M)***
XI.	***Supply(S)***

Equity Investment

XII.	***Active Equity Purchase Equity Joint Venture (EJV)***

Coding Each Agreement for its Content

- Coding – leads to Inductive reasoning -- to hypotheses – to econometric testing

Identifying and Classifying Alliance Governance Modes

2 Dimensions:

(1) Degree of inter-partner task Interaction (Thompson, 1967; Contractor, 1984; Steensma, 1996; Narula and Duysters, 2004; Kuittinen et al., 2009)**:**

Workflows; No-way= 1, One-way= 2 and Two-way= 3

The sum of workflows of alliance deal components

Agreement Elements and Degrees of interaction

Alliance Type	Degree of Interaction
Asset Purchasing, Loan and Equity	No-Way= 1
License, Contract Research, Contract Development, Manf. and Supply	One-Way= 2
Cross-License, Joint Research and Joint Development	Two-way= 3

(2) Degree of Contract Complexity:

The number of deal elements (e.g., licensing + Joint Research + Joint Development)

The number of pages of alliance agreement (Hagedoorn and Hesen, 2009)

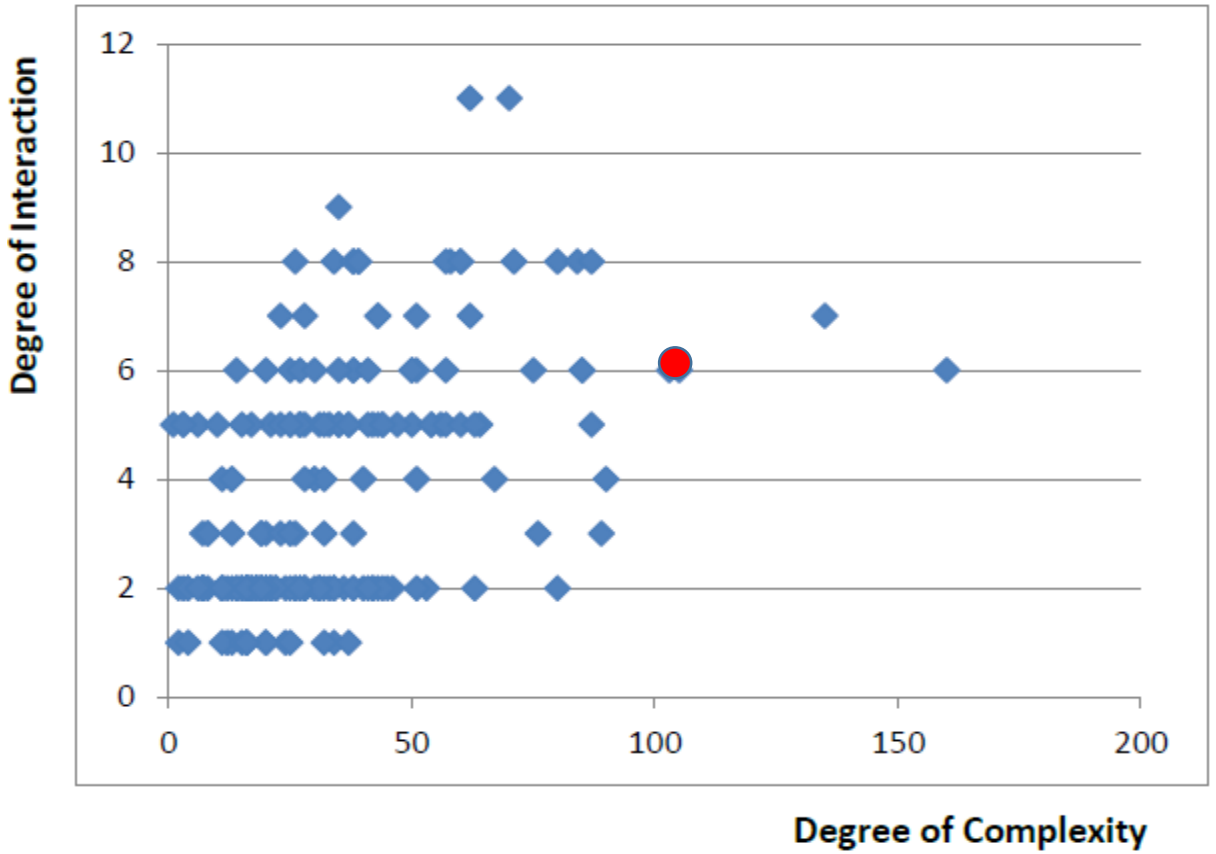
The Size of contract file (html format size such as kbyte)

Identifying and Classifying Alliance Governance Modes

- **Classifying Alliance Governance Modes** (cont'd)

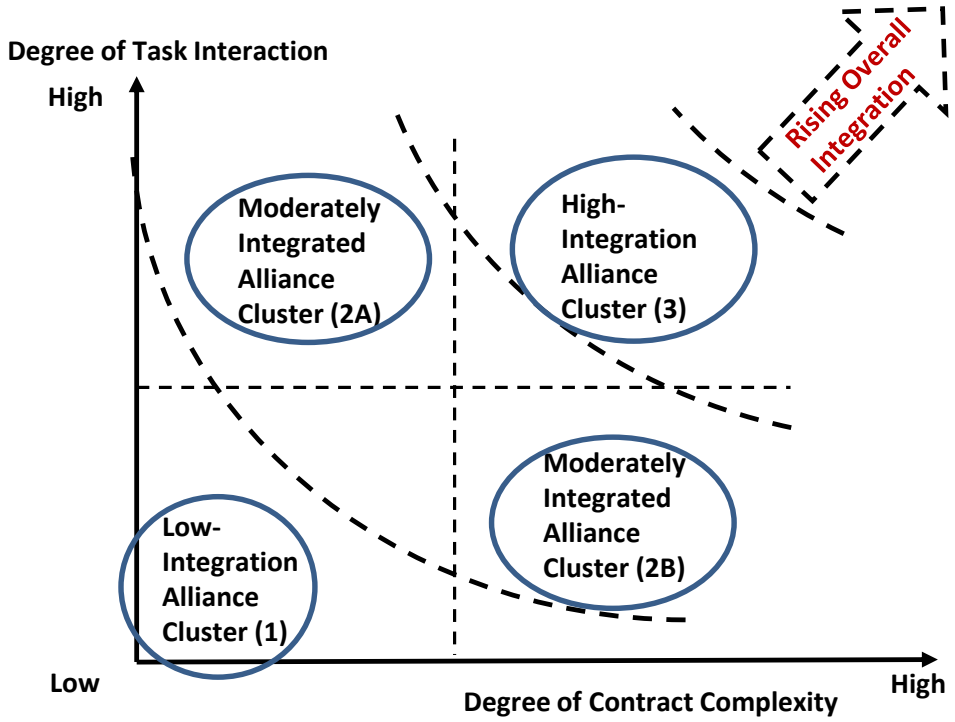
  - An example of alliance governance mode classification

  - Cross-license + Joint Research
  - Degree of Interaction: 3+3= 6
  - Degree of Complexity: 105 pages/ size of contract file (KB)

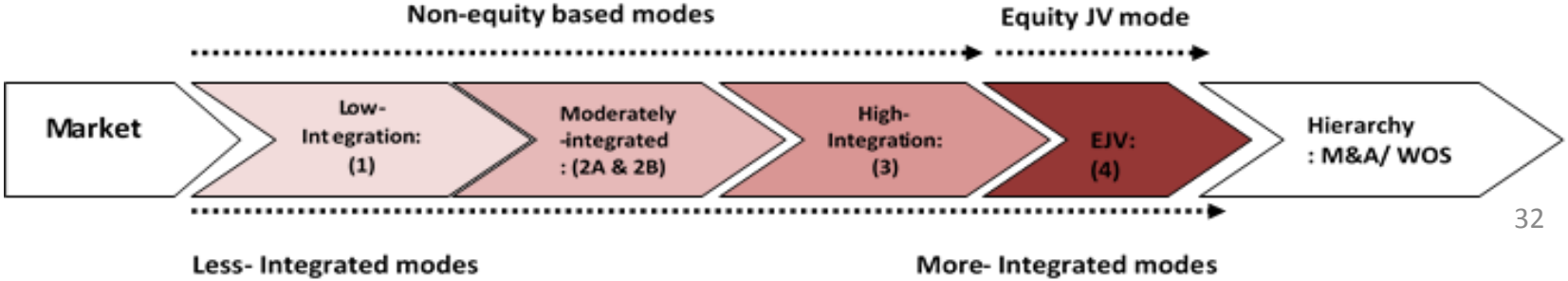


A Two-Way Classification of Alliances

- **A New Classification of (non-equity) Alliance Governance Mode**



A New Continuum of Alliance Governance Mode



4. Methods

- **Controls**

  - ***Firm size*** (Number of employee) and ***Age*** gap between alliance partners

  - ***Cultural Difference***: Hofstede's 5 Cultural Index

  - ***Prior Alliance Experience:*** with the same partners

  - ***Absorptive Capacity:*** Accumulated number of patents from the year established to the year alliance formed (based on 24 patent classes)

  - ***A Priori R&D Uncertainty:*** Technical difficulties in R&D process

    Drug discovery (6/5,000 to 10,000); Phase I (64%); Phase II (39%)and Phase III trial (66%).

5. Results

- **Findings (TABLE 1: Logistic Regression with Consolidated ODCC Measurement)**

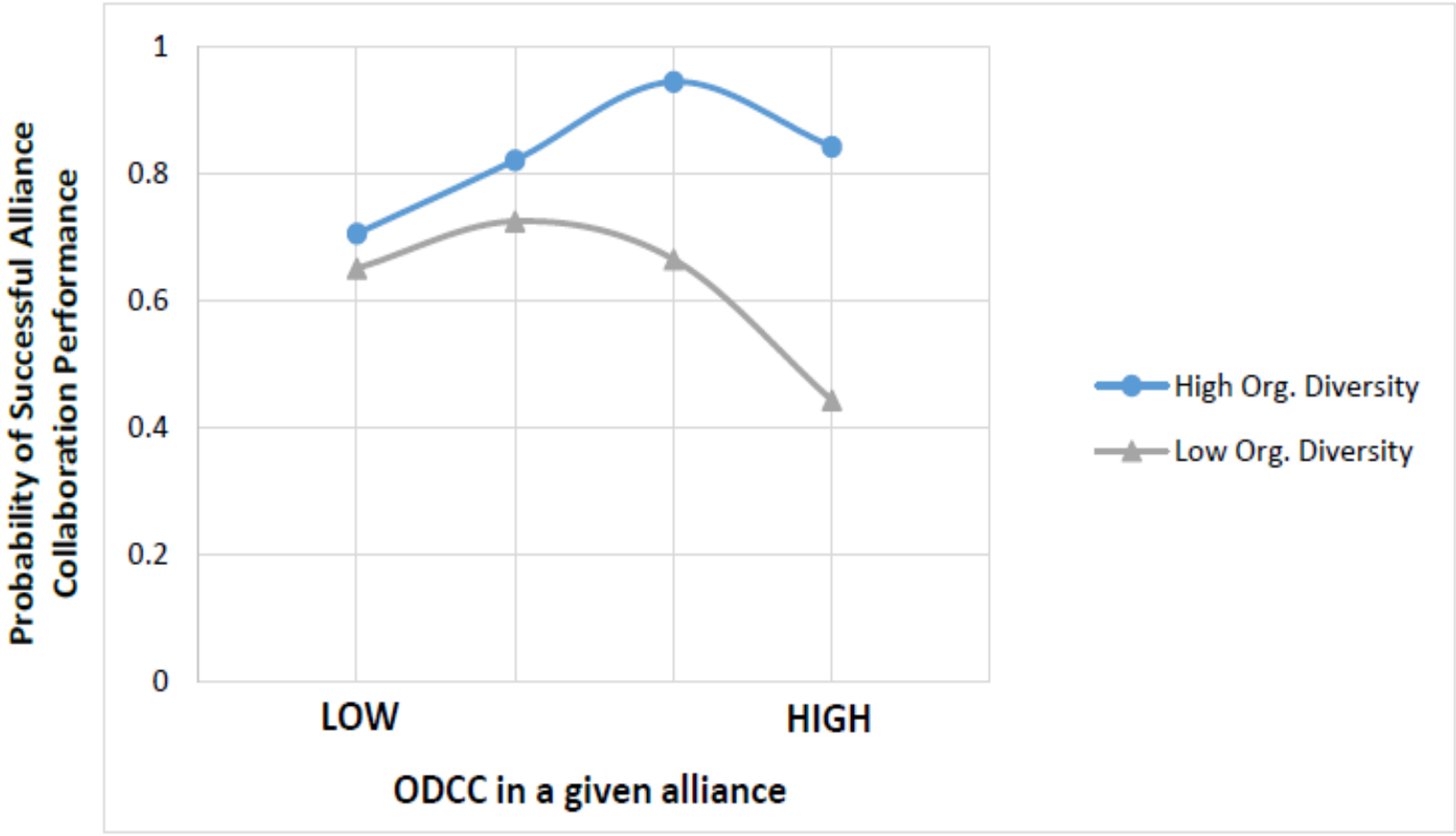
Independent Variable	Overall Degree of Communication and Coordination Consolidated			
	Model 1	Model 2	Model 3	Model 4
Age	0.064 (.04)*	0.055 (.04)	0.037 (.04)	0.046 (.04)
Size	0.015 (.03)	0.011 (.03)	0.020 (.03)	0.006 (.03)
Alliance Experience	0.689 (.51)	0.546 (.52)	0.462 (.58)	0.394 (.53)
R&D Uncertainty	-0.181 (.14)	-0.170 (.14)	-0.209 (.14)	-0.171 (.15)
Absorptive Capacity	-0.012 (.06)	-0.014 (.01)	-0.039 (.02)*	-0.019 (.01)
Cultural Difference	0.035 (.13)	0.071 (.14)	0.088 (.13)	0.076 (.14)
Inverse Mills Ratio	1.204 (1.10)	1.764 (1.30)	4.670 (3.59)	2.475 (1.34)
ODCC in a Given Alliance		1.623 (.76)**	1.760 (.78)**	8.38 (6.99)
$ODCC^2$ in a Given Alliance	H1 →	-0.371 (.15)***	-0.404 (.16)***	-1.154 (1.46)
Organizational Diversity			-27.31 (3.60)***	
ODCC*Organizational Diversity			31.513 (3.46)***	
$ODCC^2$ *Organizational Diversity		H2 →	-5.218 (.68)***	
Technological Base Diversity				-15.075 (8.68)
ODCC * Tech. Base Diversity				10.629 (7.64)
$ODCC^2$ * Tech. Base Diversity			H3 →	-1.623 (1.61)
Year Dummies (2000 ~ 2004)	Included	Included	Included	Included
-2 Log Likelihood	332.42	325.88	321.105	318.31
Chi^2	24.62***	31.16***	35.94***	38.23***
NagelKerke R^2	0.11	0.15	0.18	0.18
N	269	269	269	269

Robust standard errors are in parentheses
*P < .10 ; **P < .05 ; ***P< .01

5. Results

- **Findings (cont'd)**

A Moderating Effect of Organizational Diversity



6. Conclusions

(1) Probability of successful R&D performance depends on the overall degree of coordination and communication; ***a moderate degree*** of ODCC contributes to better R&D performance.
(Inverted-U-Shaped with the optimum closer to the left hand side)

(2) A more integrated alliance structure and detailed language facilitates needed interdependency/ interaction for R&D – but only up to a point.

(3) However, interaction and contract complexity beyond an optimal level negatively affects R&D outcomes / performance
- Bureaucratic Costs (dispute, re-negotiation and bargaining costs)
- Liabilities of Contractual Exchange

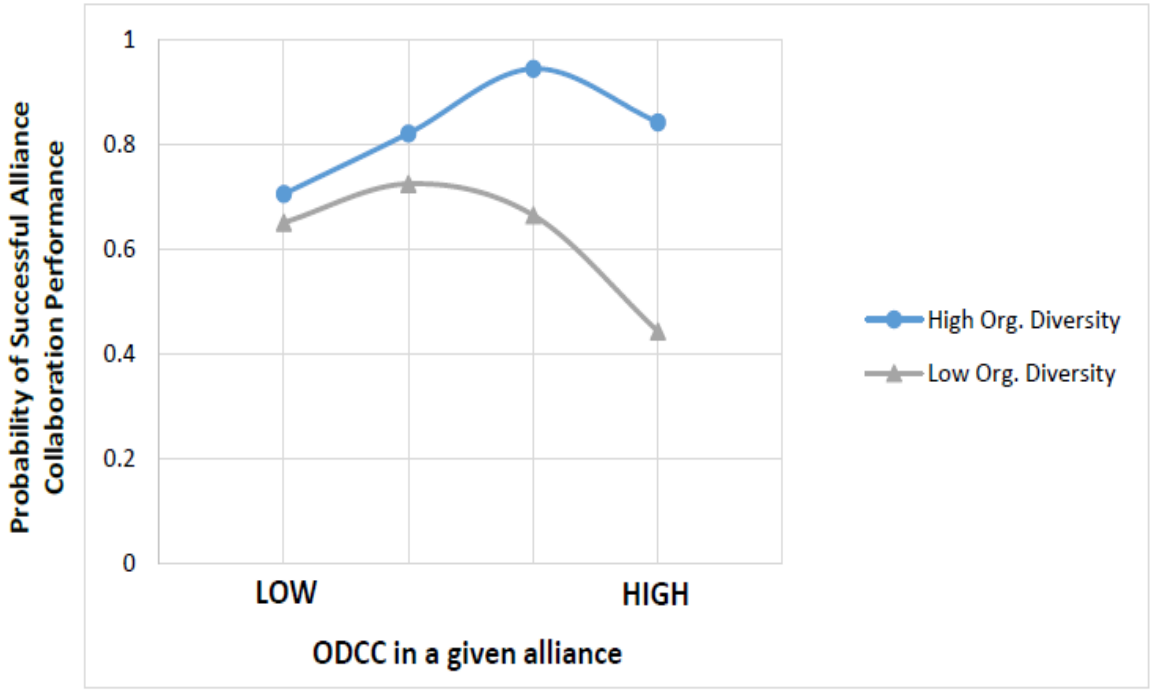
(4) Allying with Research Institutes, Universities and CROs a firm can enhance R&D performance, because of
- Reduced opportunism
- Idiosyncratic resources (e.g., knowledge/technologies)

6. Conclusions

(5) When allying with a partner with a dis-similar organizational milieu (Universities, CROs, etc) it is desirable to write somewhat more complex agreements with greater ODCC.

(6) As seen in the Figure, partnering with dis-similar organizations

- Raises the likelihood of a successful R&D outcome, but also
- Pushes the optimal point further to the right

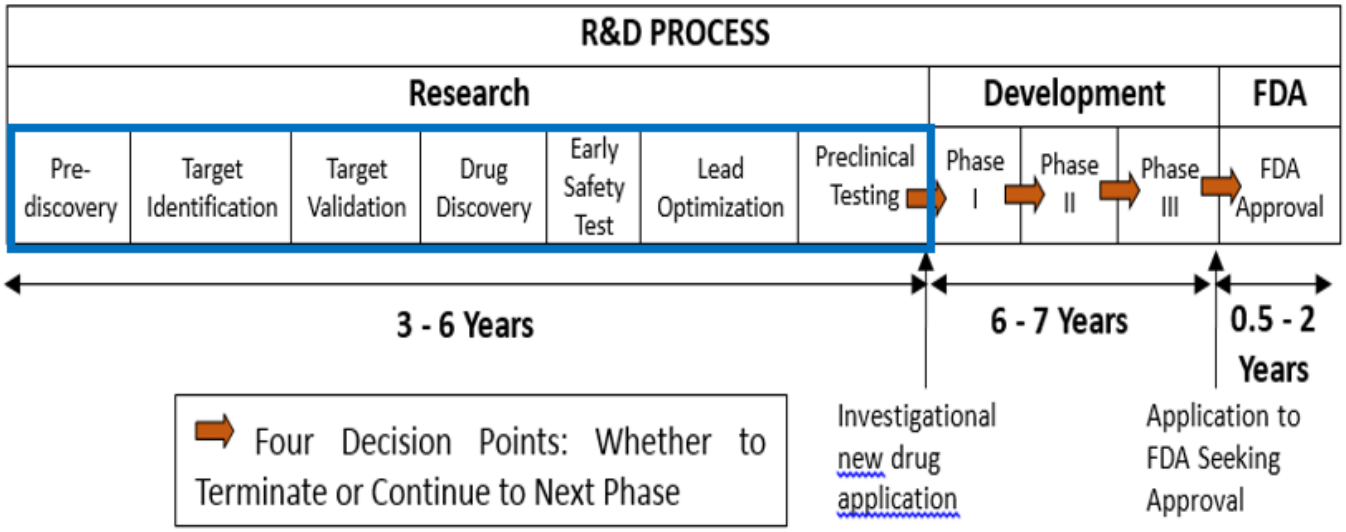


6. Conclusions

(7) The measure of R&D success in this paper is not based on unreliable criteria such as

- Company-wide indicators such as No. of R&D programs, or
- Surveys of R&D satisfaction

(8) Rather, here it is project-specific and based on an unambiguous criterion – whether to spend millions to continue the research to the next phase, OR NOT.



THANKS FOR YOUR ATTENTION

Now let’s hear from you

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APPENDIX

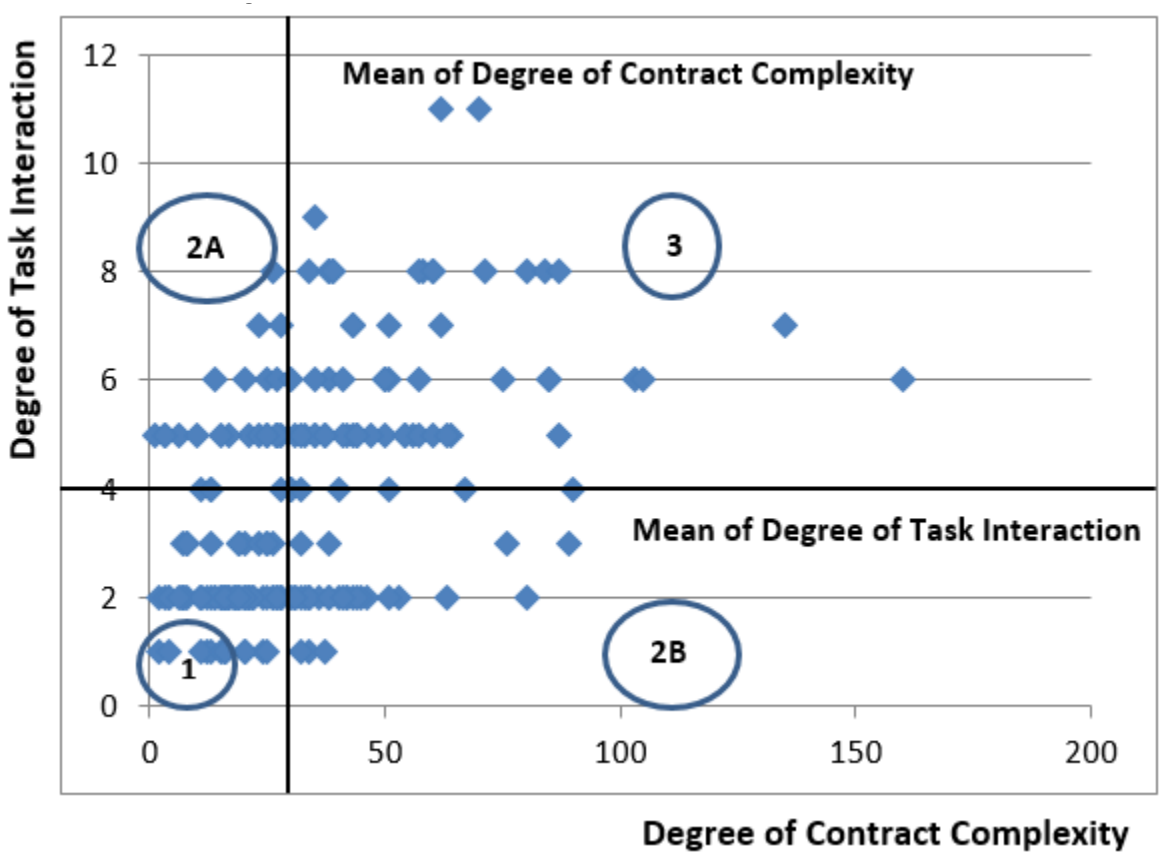
- **Robustness Test (TABLE A-1: Logistic Regression with separated ODCC measurements)**

Independent Variable	Overall Degree of Communication and Coordination Separated			
	Task Interaction (Communication)		Contractual Complexity (Coordination)	
	Model 5	Model 6	Model 7	Model 8
Age	0.052 (.04)	0.040 (.04)	0.064 (.04)	0.054 (.04)*
Size	0.010 (.03)	0.016 (.03)	0.003 (.03)	0.008 (.03)
Alliance Experience	0.563 (.51)	0.475 (.57)	0.628 (.51)	0.552 (.56)
R&D Uncertainty	-0.169 (.14)	-0.201 (.14)	-0.159 (.14)	-0.190 (.13)
Absorptive Capacity	-0.014 (.01)	-0.035 (.02)*	-0.009 (.01)	-0.028 (.02)
Cultural Difference	0.066 (.14)	0.074 (.13)	0.061 (.13)	0.067 (.13)
Inverse Mills Ratio	2.010 (1.29)	5.750 (3.75)	1.452 (1.27)	4.943 (3.46)
Task Interaction	0.377 (.16)**	0.378 (.17)**		
Task Interaction^2	-0.026 (.01)**	-0.027 (.01)***		
Organizational Diversity		-36.746 (2.18)***		-43.519 (2.5)***
Task Interaction*Organizational Diversity		19.878 (.90)***		
Task Interaction^2 *Organizational Diversity		-1.155 (.05)***		
Contractual Complexity			0.352 (.16)**	0.349 (.17)**
Contractual Complexity^2			-0.025 (.01)**	-0.025 (.01)**
Contractual Complexity*Organizational Diversity				23.766 (1.13)***
Contractual Complexity^2 *Organizational Diversity				-1.386 (.07)***
Year Dummies (2000 ~ 2004)	Included	Included	Included	Included
-2 Log Likelihood	324.828	316.874	325.941	317.977
Chi^2	32.22***	40.17***	29.08***	37.04***
NagelKerke R^2	0.15	0.19	0.14	0.18
N	269	269	269	269

Robust standard errors are in parentheses
*P < .10 ; **P < .05 ; ***P< .01

APPENDIX: Discriminant Analysis

- **Classifying Alliance Governance Structure based on the Coordination and Communi**



- **Discrimin**
  - (1) Low-I
  - (2A) Moc
  - (2B) Moc
  - (3) High-

- **TABLE A-3**

Function	Eige					l.f.	Sig.
1	3.149	87.3	87.3	.871	.165	367.242	6	.000
2	.458	12.7	100.0	.561	.686	76.981	2	.000

APPENDIX: Discriminant Analysis

- **Discriminant Analysis (cont'd)**

- **TABLE A-4: Classification Results**

		Governance Mode	Predicted Group Membership				Total
			1	2A	2B	3	
Original	Count	1	108	1	0	0	109
		2A	0	45	0	0	45
		2B	1	0	24	0	25
		3	0	13	0	53	66
	%	1	99.1	.9	.0	.0	100.0
		2A	.0	100.0	.0	.0	100.0
		2B	4.0	.0	96.0	.0	100.0
		3	.0	19.7	.0	80.3	100.0

APPENDIX: Descriptions

- **Types of Alliance**

Type	Description	Degree of Interaction
Asset Purchase (AP)	One company acquires legal control of one or more physical assets such as **manufacturing plants/ equipment, all finished or work-in-progress product inventories, all laboratory supplies,** **laboratory animals and so on**.	1
Joint Development (JD) : clinical Trial stages	Both parties participate in and **share the costs and risks of clinical Development and/or commercial expenses**; - Both parties may form a JSC (Joint Steering Committee- an advisory committee) to design and monitor the clinical development plan - Both parties are responsible for all direct and indirect costs and expenses incurred in carrying out Development Activities - Both parties prepare and review protocols for clinical trials One party conducts a clinical trial and keeps informed of its progress to the other party by providing summary reports, while the other party provides or transfers technology for clinical trials.	3

APPENDIX: Descriptions

- **Types of Alliance (cont'd)**

Type	Description	Degree of Interaction
Passive Equity Purchase (not a JV) (E)	An agreement in which one company issues shares of its stock to the other company, either in **exchange for cash or as repayment of a loan**. Many agreements utilize Equity investments as part of the upfront or continuing compensation to the originating company; - Equity purchase is a method of payment for certain research services (e.g., screening and analysis) - Equity purchase as research funding; any costs incurred by a party performing research activities can be reimbursed by the other party	1
Joint Research (JR) : drug discovery stage	**Both parties participate in research activities**. The term collaboration is used for describing collaborative activities in research phase; - Both parties shall cooperate in the performance of the research program at its own cost - Both parties may exchange such data, information and materials necessary for other party to perform its obligations under any research plan - Either party may supply the other party with proprietary materials for use in the research program - Collaboration activities include screening assays for identifying and testing the activity of compounds, and selecting lead compounds for clinical development and commercialization	3

APPENDIX: Descriptions

- **Types of Alliance (cont'd)**

Type	Description	Degree of Interaction
Cross-Licensing (Crl)	One party obtains a license to intellectual property of the other party in exchange for granting a license to its own intellectual property	3
Contract Development (CD)	**One party sponsors clinical trials** at the other company (e.g., a pharma company sponsors clinical trials at a small biotech, where the biotech completes all developments (i.e., clinical trials on its own); one party conducts, monitors and governs clinical trials in accordance with the protocols. And the sponsoring party can request status reports to the sponsored party. Or, in other case, one party is responsible to conduct clinical trials and bear all expenses for the trials; doing it on its own	2

APPENDIX: Descriptions

- **Types of Alliance (cont'd)**

Type	Description	Degree of Interaction
License (L)	**One party obtains a License under the other party's intellectual property** to research, develop, make, use, sell, or market or promote a product or technology. Under a License agreement, the originator of the technology typically retains some rights in the product/technology and receives continuing payments such as milestone payments and royalties on net sales of the product/technology throughout the term of the agreement	2
Loan (Lo)	A Loan is **a payment or promise of future payment** from one party to another. Repayment may be in the form of cash or equity from the borrowing company. Loan can be used as study or **research funding**. And in return, the party proving the fund will receive a royalty payment upon any achievements in clinical stages and/or regulatory stage	1

APPENDIX: Descriptions

- **Types of Alliance (cont'd)**

Type	Description	Degree of Interaction
Manufacturing (M)	In a Manufacturing agreement, **one party manufactures a product**, usually a compound, for use by the other company in clinical development or commercialization stages. And the manufacturing agreement normally does not include supply/ delivery of the product	2
Supply (S)	In a Supply agreement, the company will make or have made a product for use or sale by the Client company. And the major difference between supply agreement and manufacturing is that **supply agreement usually contains delivery/distribution of products to the client company** as opposed to manufacturing focuses on the manufacture of certain compounds - Supply agreement shall contain the supply of lead compound for clinical development as well as a drug substance using as the active pharmaceutical ingredient in a human drug product	2

APPENDIX: Descriptions

- **Types of Alliance (cont'd)**

Type	Description	Degree of Interaction
Contract Research (CR)	In a Research agreement, **a sponsoring party engages another party to perform research services** in the discovery and/or lead stages of an R&D project; in a shorter term, it is a contract research	2
Equity Joint Venture (EJV)	Company A and company B (or more parties) **create a new separate legal entity**	N/A