

Arthur D Little

Biotechnologies: Parlons Vrai

**Overview of Biotechnology Sector
and Business Models**

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- 1** **Biotechnology Sector Overview**
- 2 Business Models
- 3 Conclusions

1. Biotechnology Sector Overview

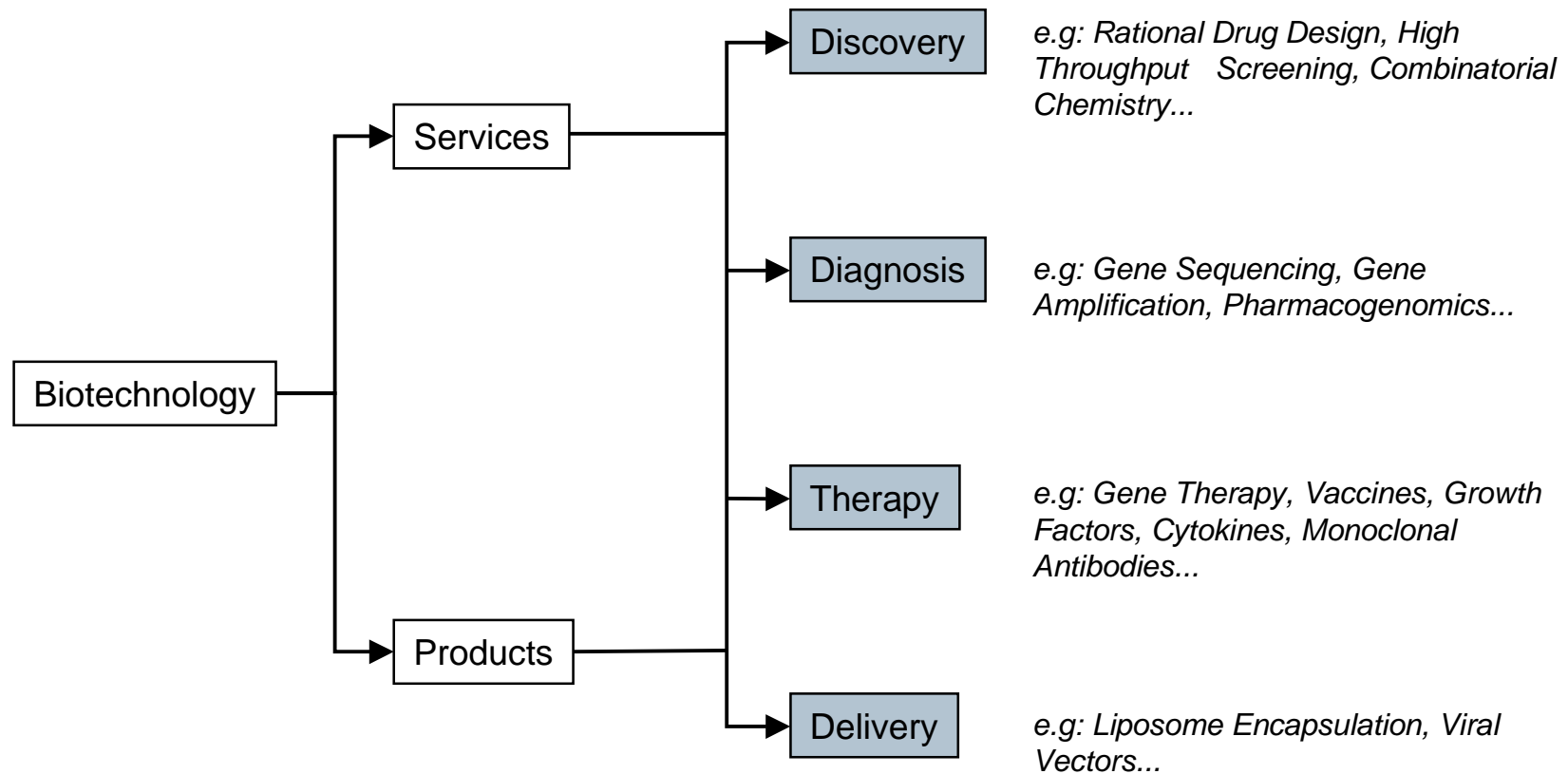
Biotechnology is not defined by the type of products, but by technologies used to make those products

“Biotechnology refers to a set of new techniques that uses organisms or their cellular, subcellular, or molecular components to:

- *Make products*
- *Modify plants, animals and microorganisms to carry desired traits”*

Sources: US Department of Commerce,
Office of Technology Policy, July 1997

Biotechnologies have enabled the commercialization of products and services with a wide range of applications



Biotechnology boomed during the 1980s in USA as a result of confluent forces

Technology Breakthroughs in BioSciences

- 1973: First DNA genetic engineering techniques
- 1975: First monoclonal antibody
- 1977: First expression of human gene in bacteria
- 1982: First biotech product in the market (Humulin)

Capital Market Appetite for Biotechnology

- Booming of Venture Capital
- Changes in pension fund regulations allowing more speculative investments

BIOTECHNOLOGY

Cultural Shift Towards Entrepreneurial Business Models

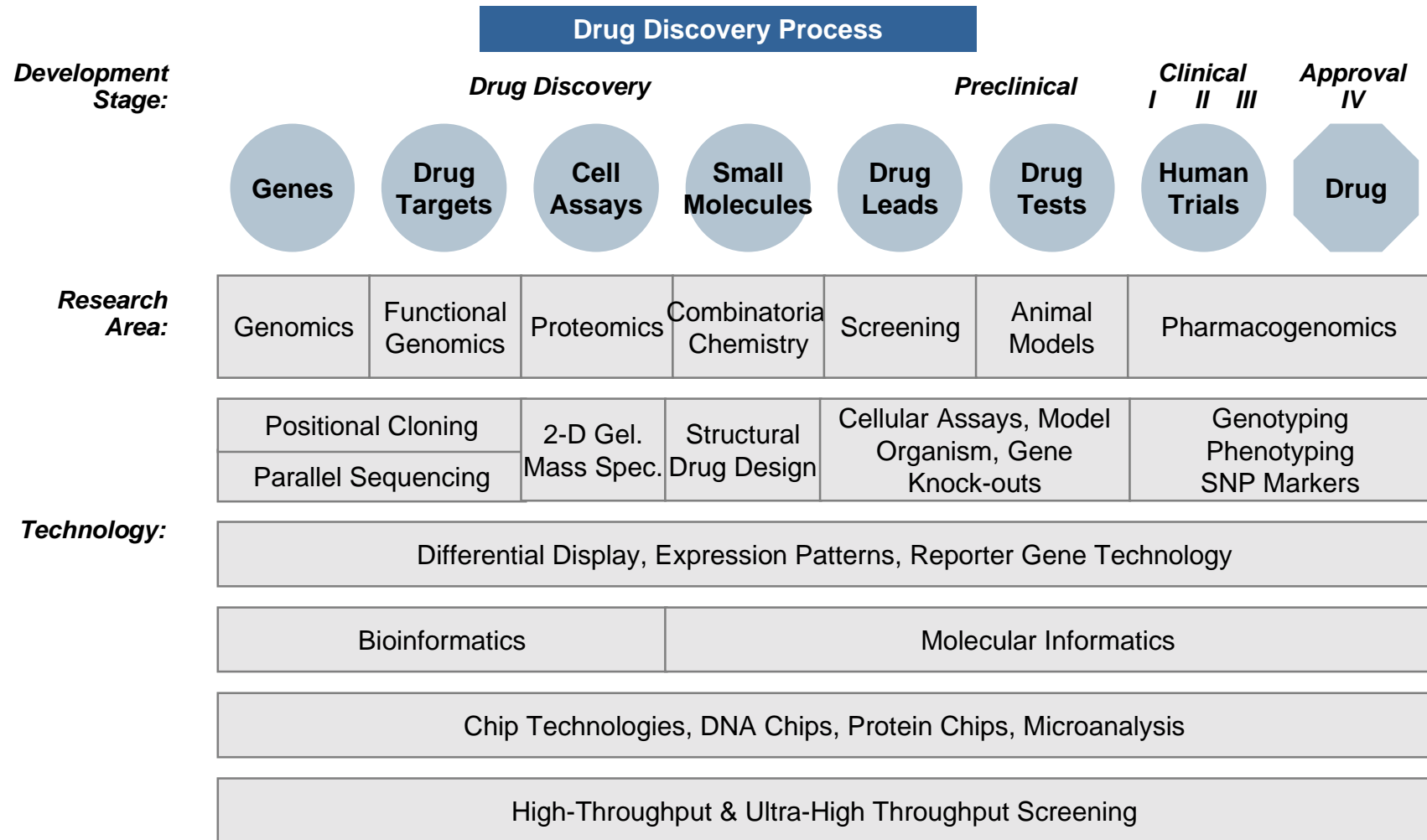
- The sometimes bureaucratic nature of pharmaceutical R&D
- “Open-door” practice allowing academics to dedicate a portion of their work to outside activities

Favorable Government Policies

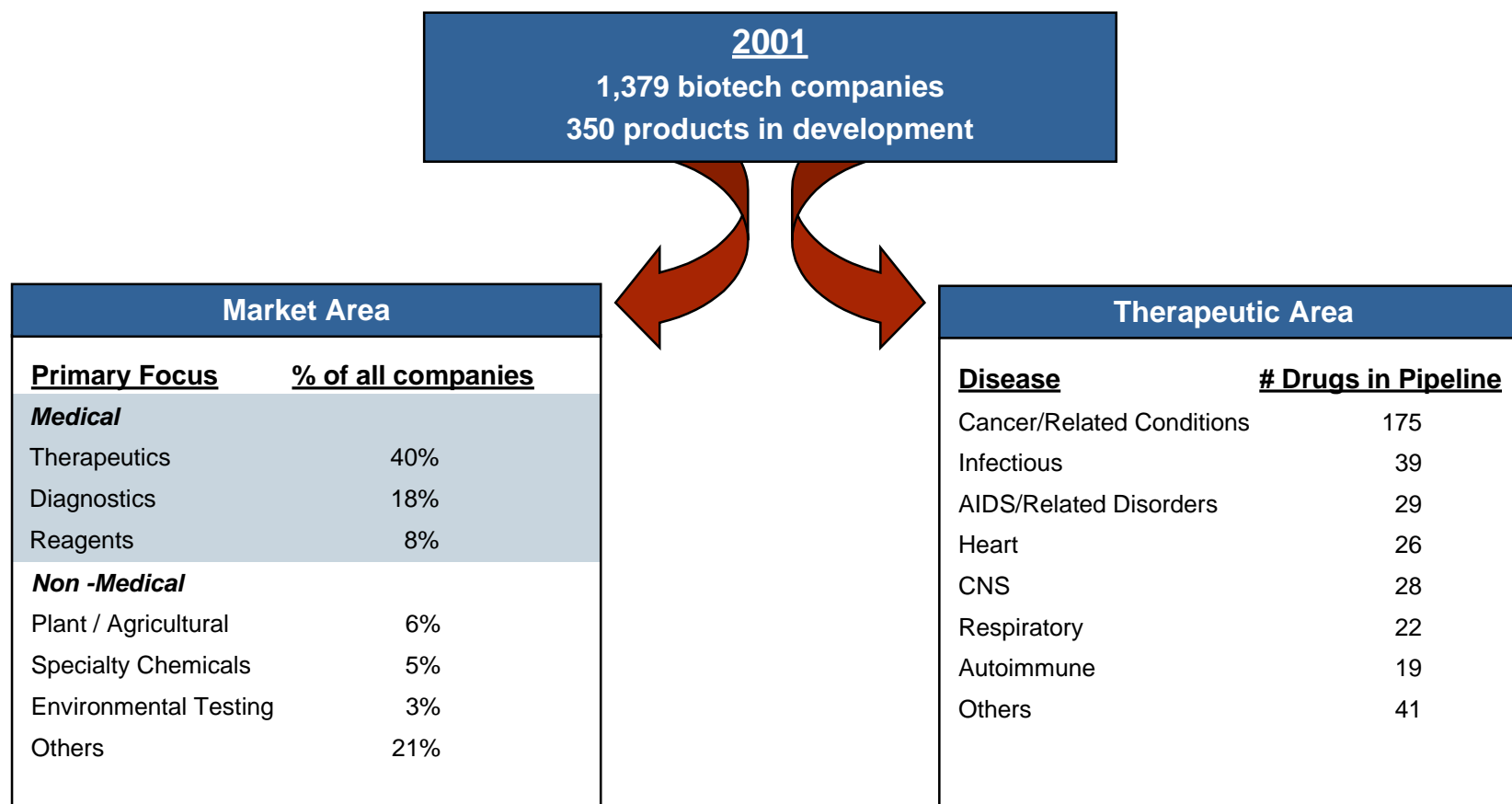
- Increased government funding of medical research
- Technology transfer policies under the Reagan administration

Sources: Arthur D. Little

The impact of biotechnologies is evident across the entire drug discovery development and production process

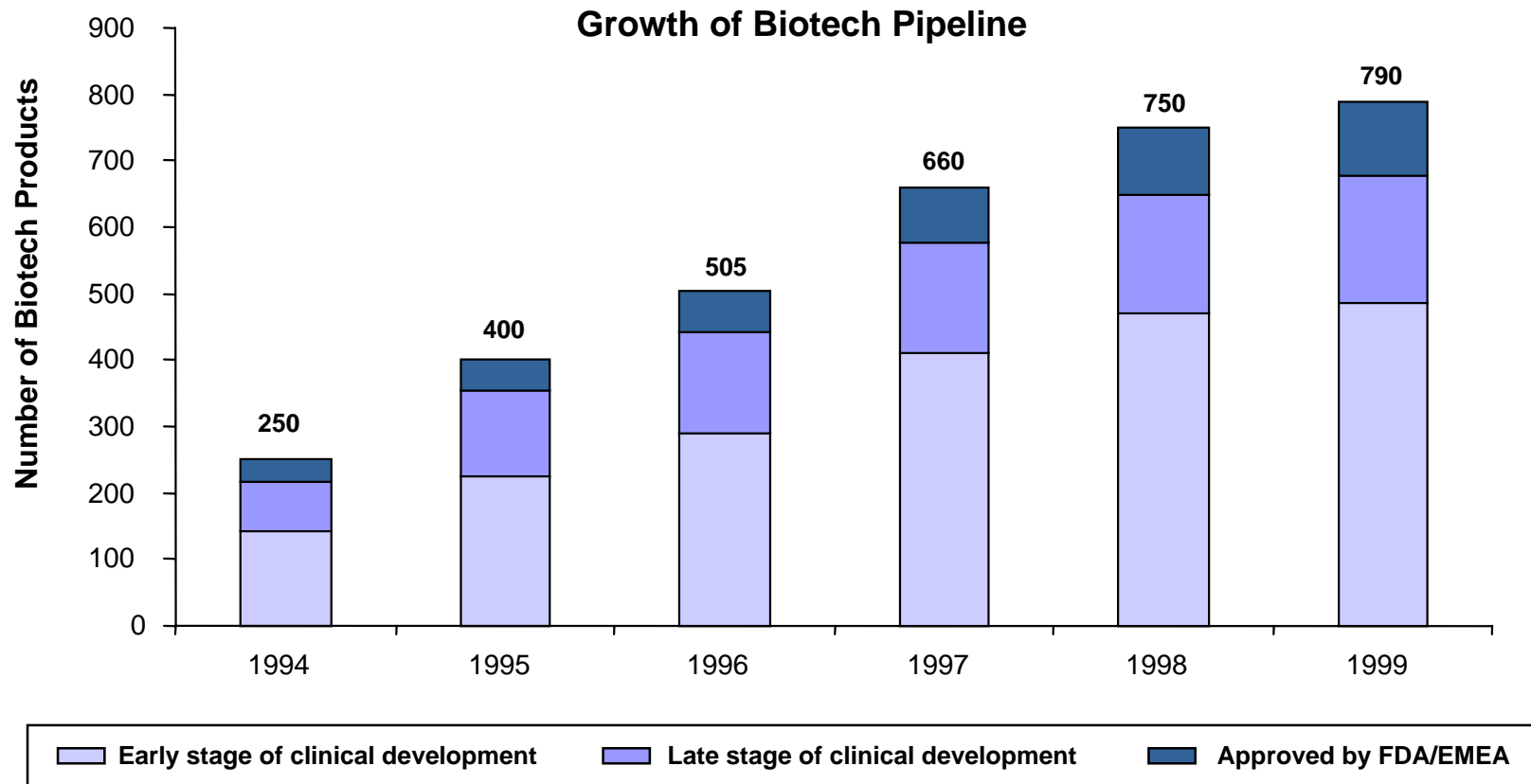


Therapeutics is the most heavily targeted market area, with cancer being the largest therapeutic area being investigated



Sources: PhRMA Annual Report 1999, ADL Estimates, PhRMA "Biotechnology 2000"

The biotech pipeline continues to grow, with 117 biotech products approved by the FDA in 2001



The innovation potential of these small companies is in general higher than in the larger pharmaceutical groups

Sources: Goldman Sachs & Co, PhRMA

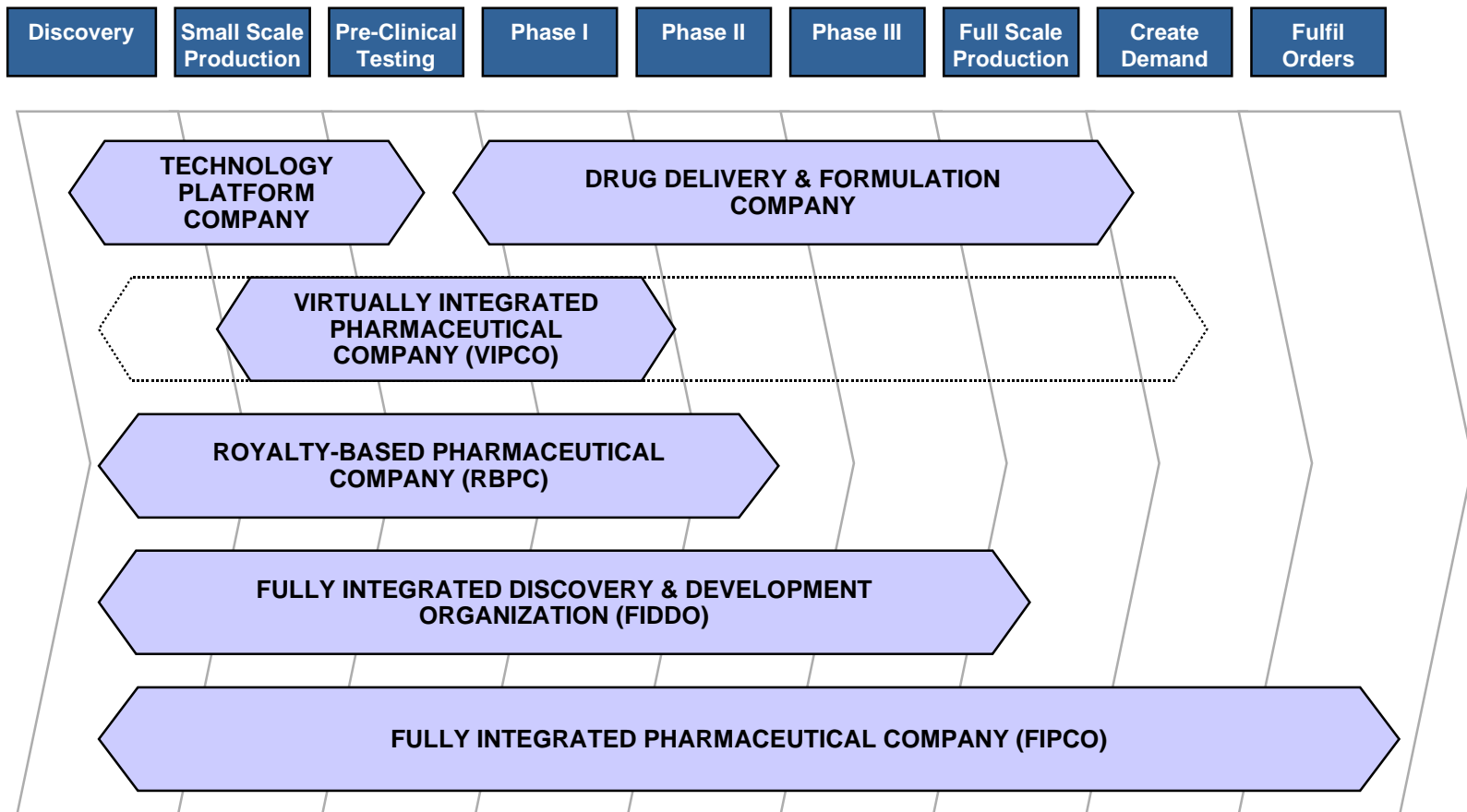
Roadmap

- 1 Biotechnology Sector Overview
- 2 **Business Models**
- 3 Conclusions

The road to success for an entrepreneur in biotechnology is long and challenging

- 1 Risk and complexity of a biotech medical development
- 2 Raising of sufficient capital while keeping control of the enterprise
- 3 Access to adapted technical and managerial resources and needed competencies
- 4 Production of biological products (e.g. recombinant proteins)
- 5 Patent and regulatory constraints
- 6 Ethical challenges particularly in Europe

To address these challenges, Biotechnology companies pursue different strategies according to the level of risk they wish to assume



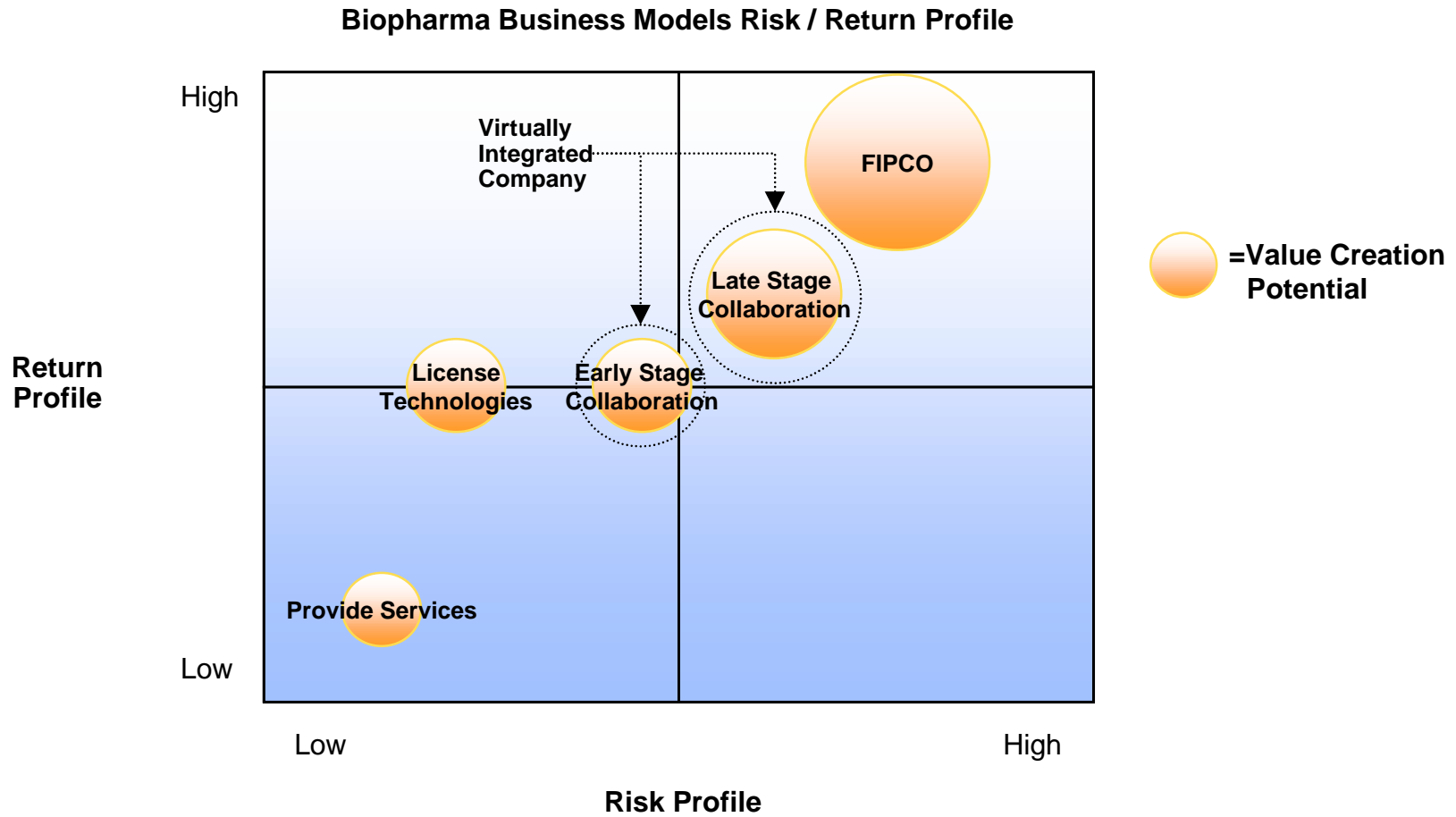
Sources: Arthur D. Little

Most biotech companies employ one or more of the following six types of business models

Biopharma Business Models

	Business Model	Description
1	Provide Services	<ul style="list-style-type: none"> • Provide services for a client typically on a fees-for service basis (+ sometimes royalties)
2	License Technology	<ul style="list-style-type: none"> • License proprietary technology to companies for very specific use
3	Early Stage Collaboration	<ul style="list-style-type: none"> • Develop lead candidates and license to third party for further development following Phase I
4	Late Stage Collaboration	<ul style="list-style-type: none"> • Develop lead candidates and license to commercialization partner following Phase II or III
5	Virtual Integrated (VIPCO)	<ul style="list-style-type: none"> • Companies (e.g. venture capitalists) that “own” the compound, but all development is outsourced and compound is later partnered for commercialization
6	Full Discovery & Development (FIPCO)	<ul style="list-style-type: none"> • Develop targets and lead candidates internally and sell via internal or contract sales force

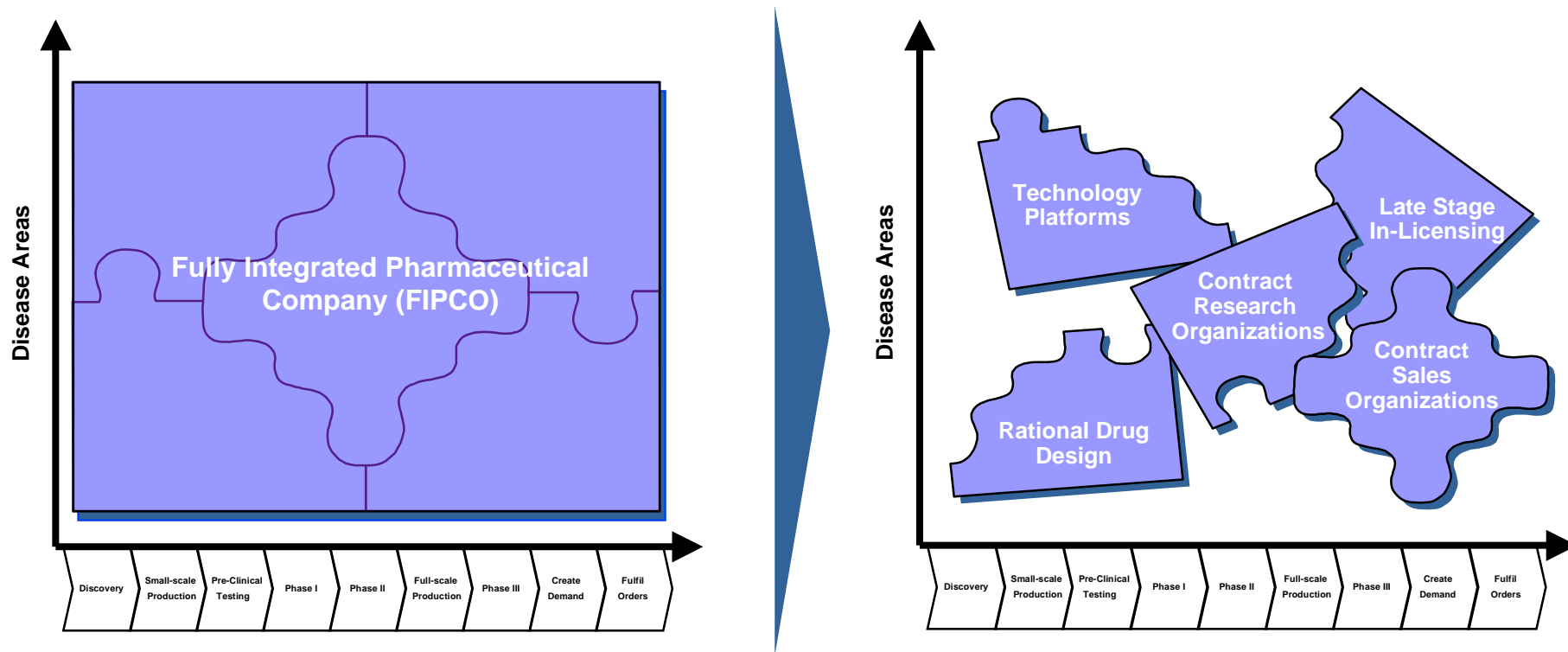
Inherent to each business model is a certain risk/reward element



2. Business Models

Disintegration of Pharma. Value Chain

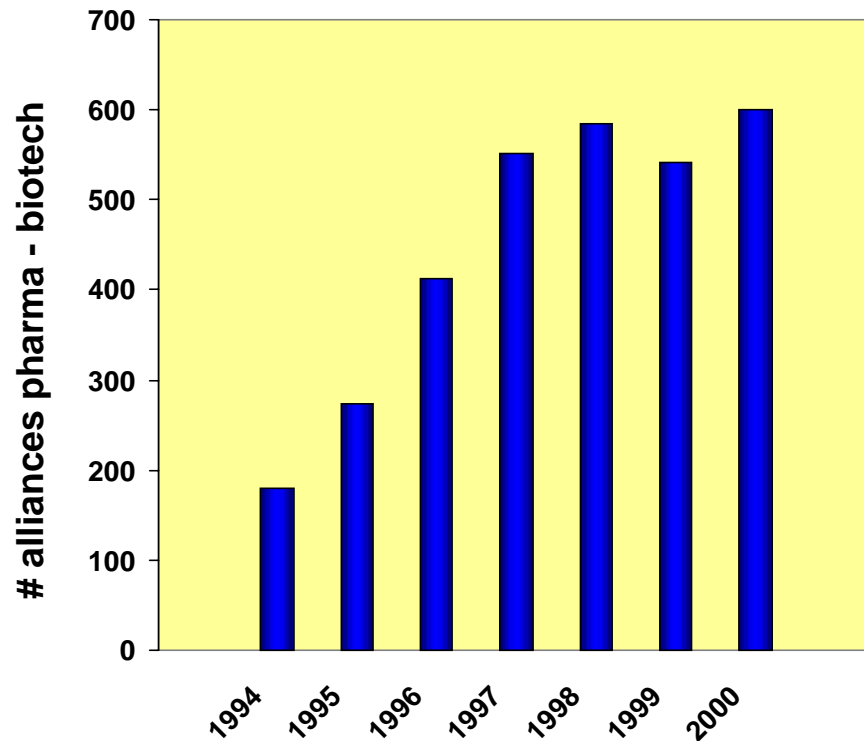
The emergence of biotech business models targeting all stages of the value chain has contributed to the evolution of the traditional pharmaceutical value chain



The Biopharmaceutical Value Chain

The Biopharmaceutical Value Chain

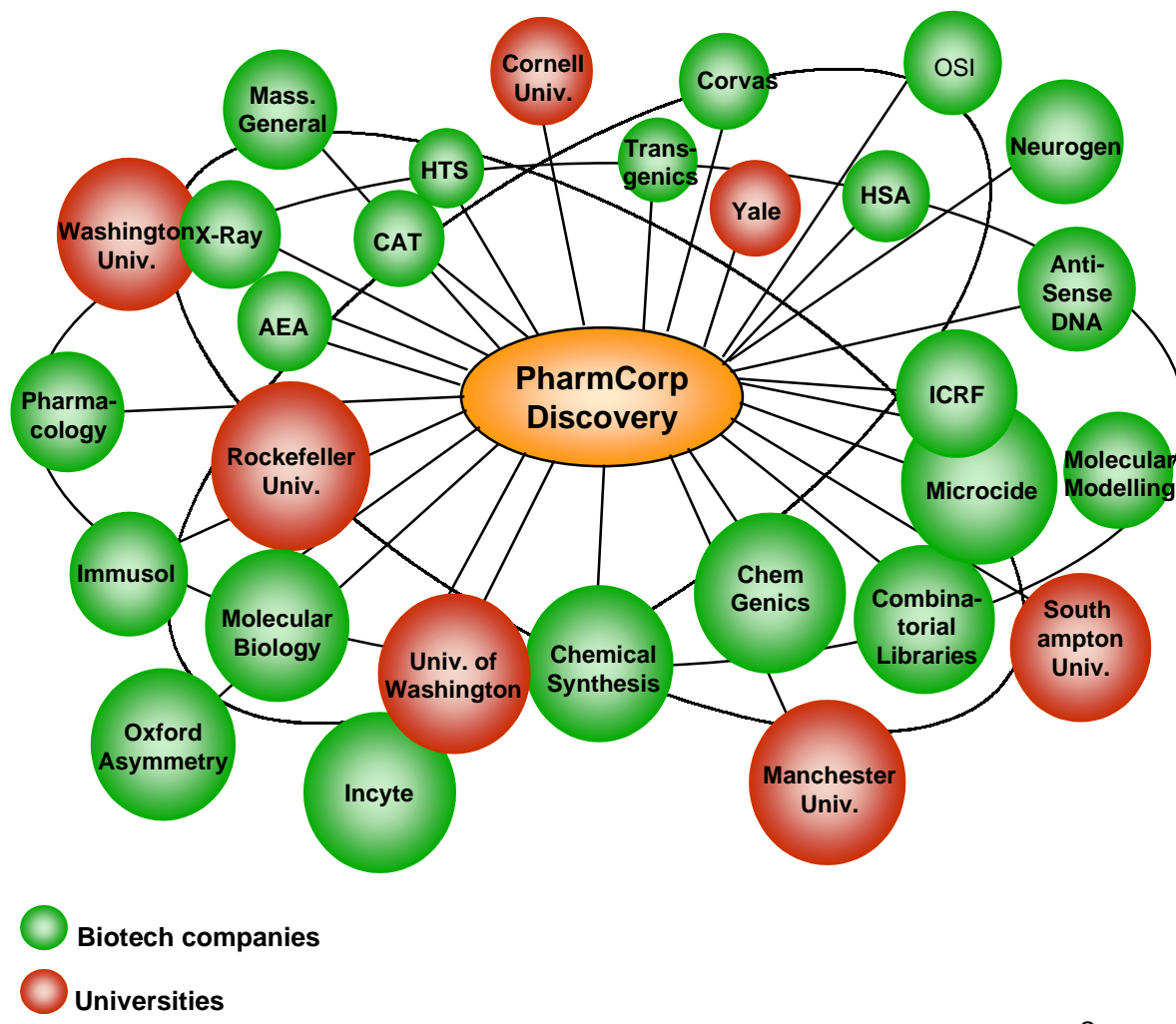
In this context, alliances between big pharma. and small and innovative Biotech start-ups have become common place



Company	# alliances 2000
Hoffmann-La Roche	129
SmithKline Beecham	92
AHP	90
Eli Lilly	76
Novartis	72
J & J	70
BMS	68
Glaxo Wellcome	68

Source: Windhover.com

Today approximately 20% of the Pharma. R&D budget is spent on alliances with Biotech and academic research institutes



Typical Partners

- Biotech companies
- Academic research and hospitals
- Other pharmaceutical companies
- Contract research organizations (CRO's)

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3. Conclusions

Biotechnology is today an opportunity for entrepreneurs

- Biotechnology will be a key driver of innovation in Healthcare
- Pharmaceutical companies will play a role in the development of biotechnologies in the future but nature of collaborations are not completely stabilized
- French context is favorable thanks to:
 - The past and current government plans ("Loi sur l'innovation",...),
 - The development of the French VCs community
 - The central and strategic role that biotechnologies have in the different plans of politicians
- To create a start-up in Biotechnology is challenging but can contribute to value generation for society (products for unmet medical needs) for founders and for other key contributors (financial investors, universities,...)