

EVOLUTION DU PROCESSUS **D'INNOVATION DANS LE SECTEUR** **PHARMACEUTIQUE**

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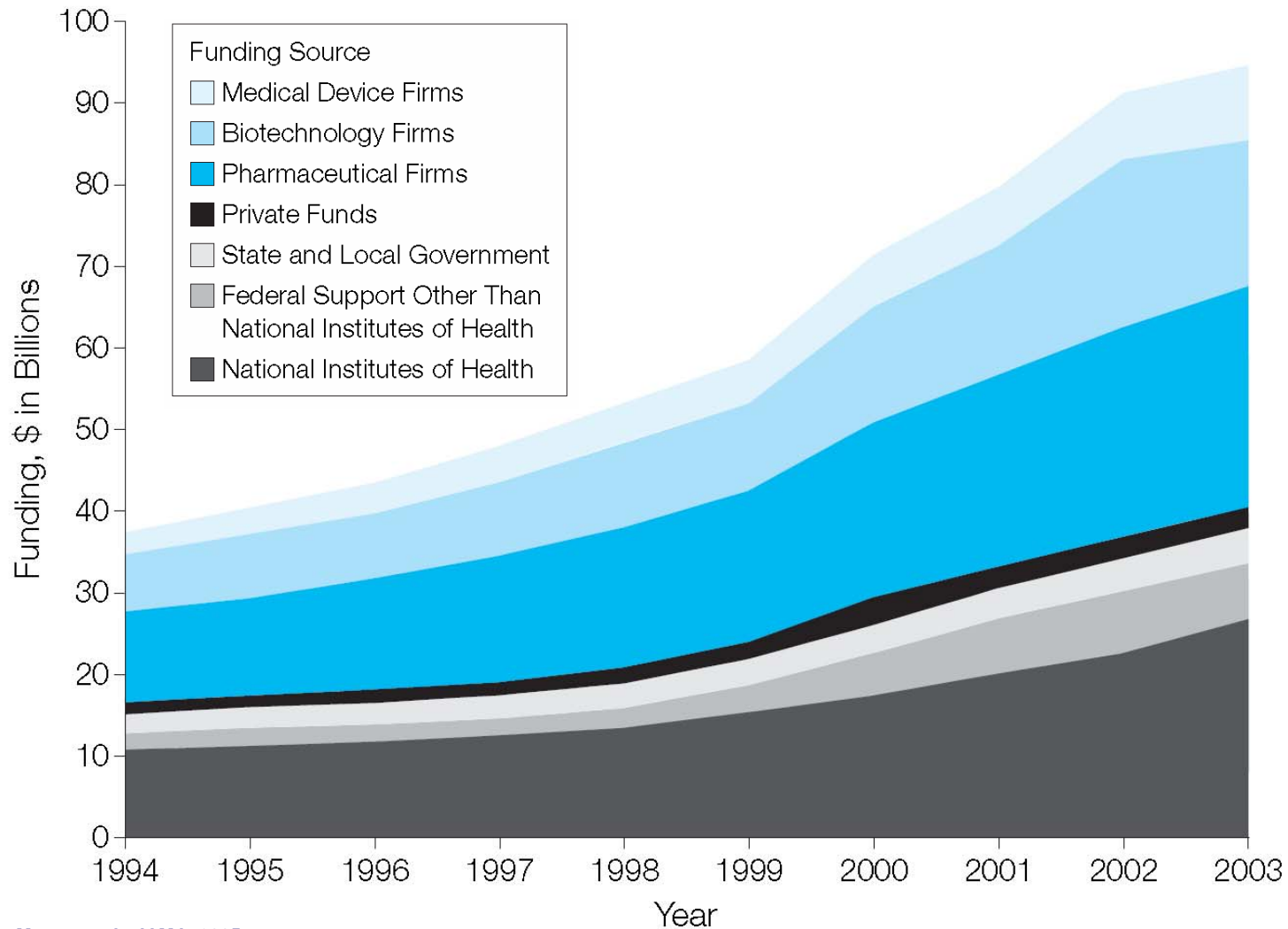
Les réseaux mondiaux d'innovation
dans l'industrie pharmaceutique
Conférence ANRT - IFRI
16 mars 2006

INNOVATION PROCESS: MAIN PHASES AND CONTRIBUTORS



	BASIC RESEARCH	APPLIED RESEARCH	PRODUCT DEVELOPMENT	CLINICAL TRIALS	APPROVAL	POST-MARKETING SURVEILLANCE
Public Research	X	X	(X)	(X)		
Small Biotech Firms	X	X	(X)	(X)	(X)	(X)
Large Pharma Firms	X	X	X	X	X	X

U.S. BIOMEDICAL RESEARCH FUNDING



Source: Moses et al., JAMA, 2005

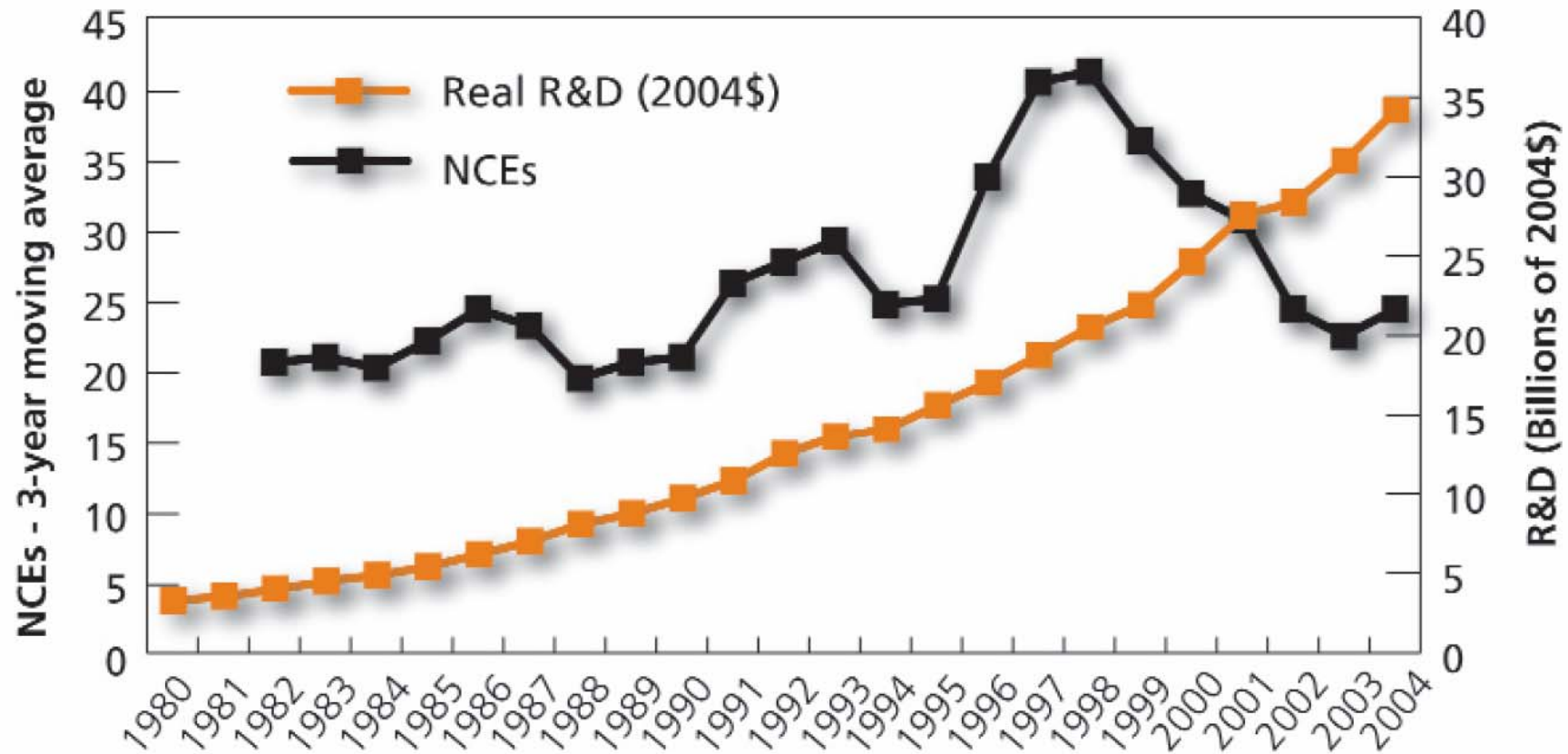
R&D SPENDING BY SECTOR: EU TOP 500 COMPANIES, 2003

Sector (FT classification)	Sector R&D as a % of total	Sector R&D/Sales
Automobiles & Parts	23.8	4.6
→ Pharmaceuticals & Biotechnology	17.0	15.2
IT Hardware	12.4	15.6
Electronic & Electrical Equipment	10.3	6.5
Chemicals	7.2	4.2
Aerospace & Defence	6.8	8.0
Engineering & Machinery	4.6	2.5
Telecommunication Services	2.8	1.0
Software & Computer Services	2.6	12.8
Oil & Gas	1.9	0.3
Others (21 sectors)	10.6	1.5
Total (31 sectors)	100.0	3.2

Data relate to the top 500 companies with registered offices in the EU ranked by the size of their R&D investments (over € 8.5 million)

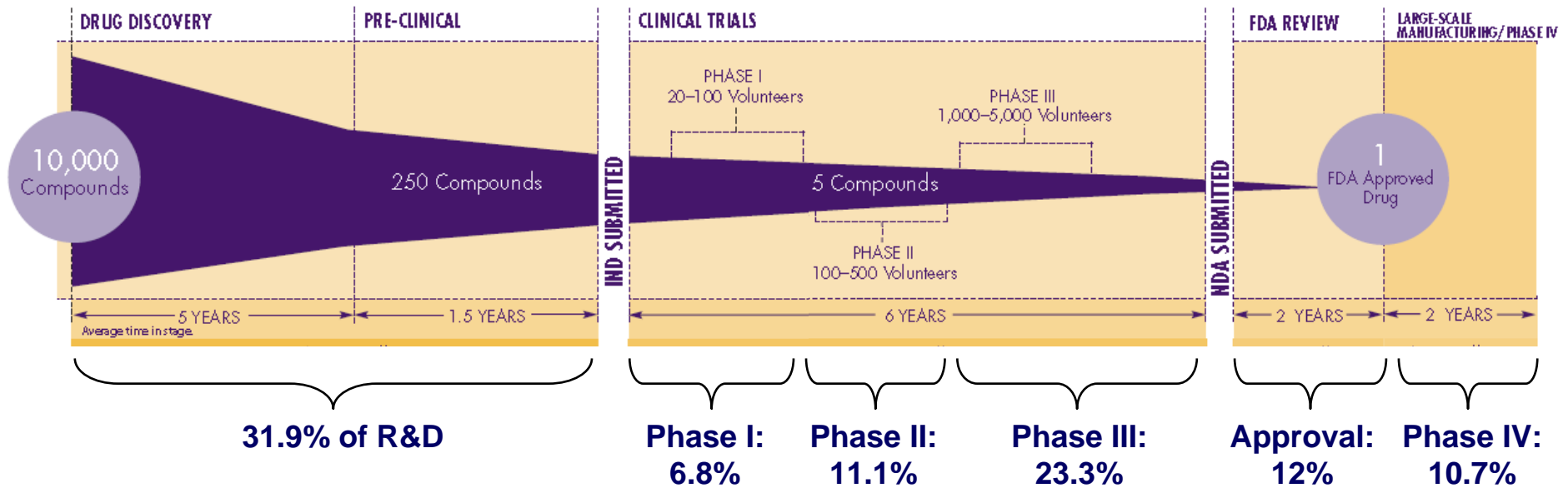
Source: The 2004 EU industrial R&D investment scoreboard, European Commission

DECLINING R&D PRODUCTIVITY



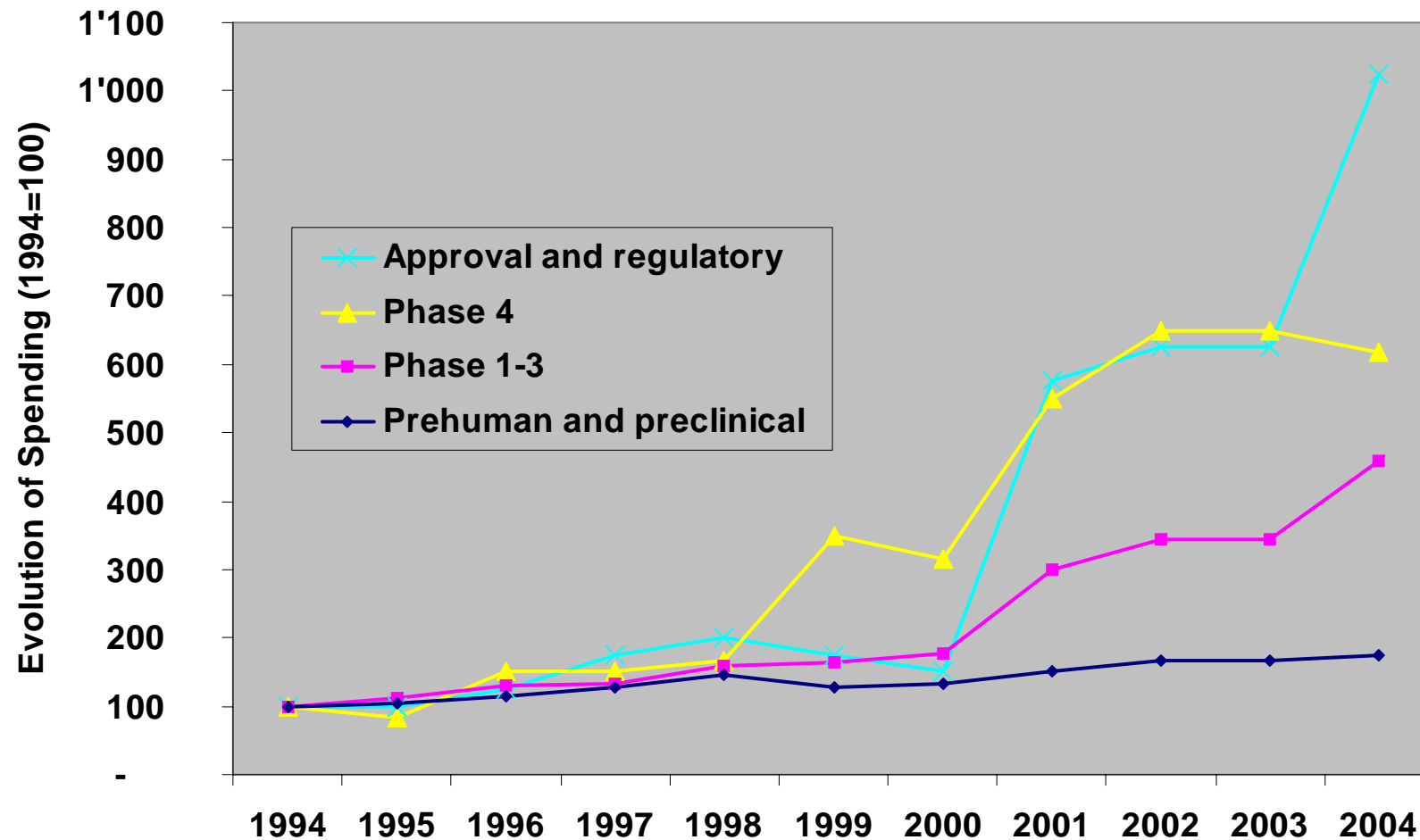
Source: Tufts CSDD Approved NCE Database; PhRMA

PHARMACEUTICAL FIRM SPENDING BY R&D PHASE



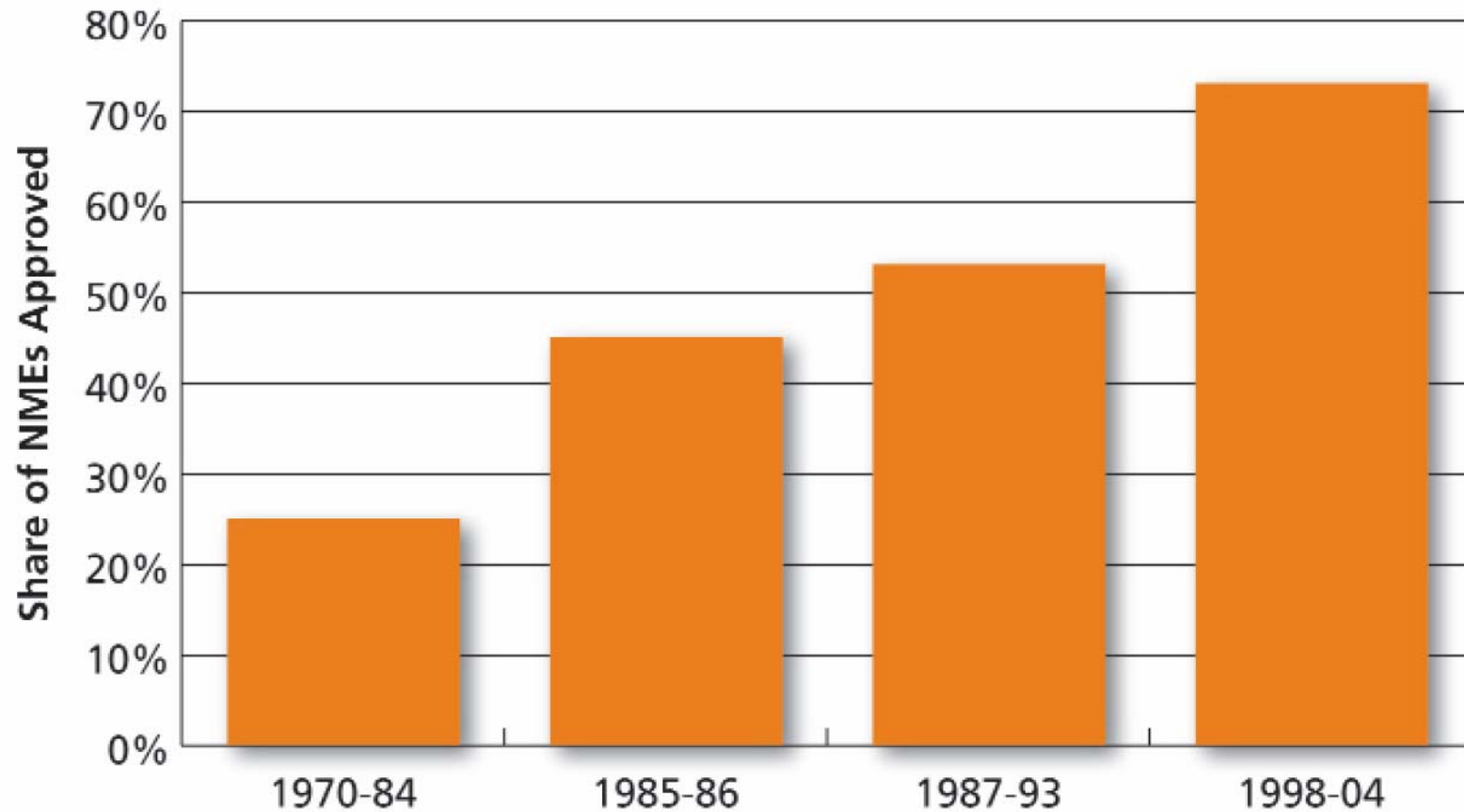
Source: PhRMA, 2005

EVOLUTION OF PHARMA FIRM SPENDING BY R&D PHASE



Source: Moses et al., JAMA, Sept. 21, 2005 (based on PhRMA)

U.S. NME APPROVALS WITH PHASE IV COMMITMENTS

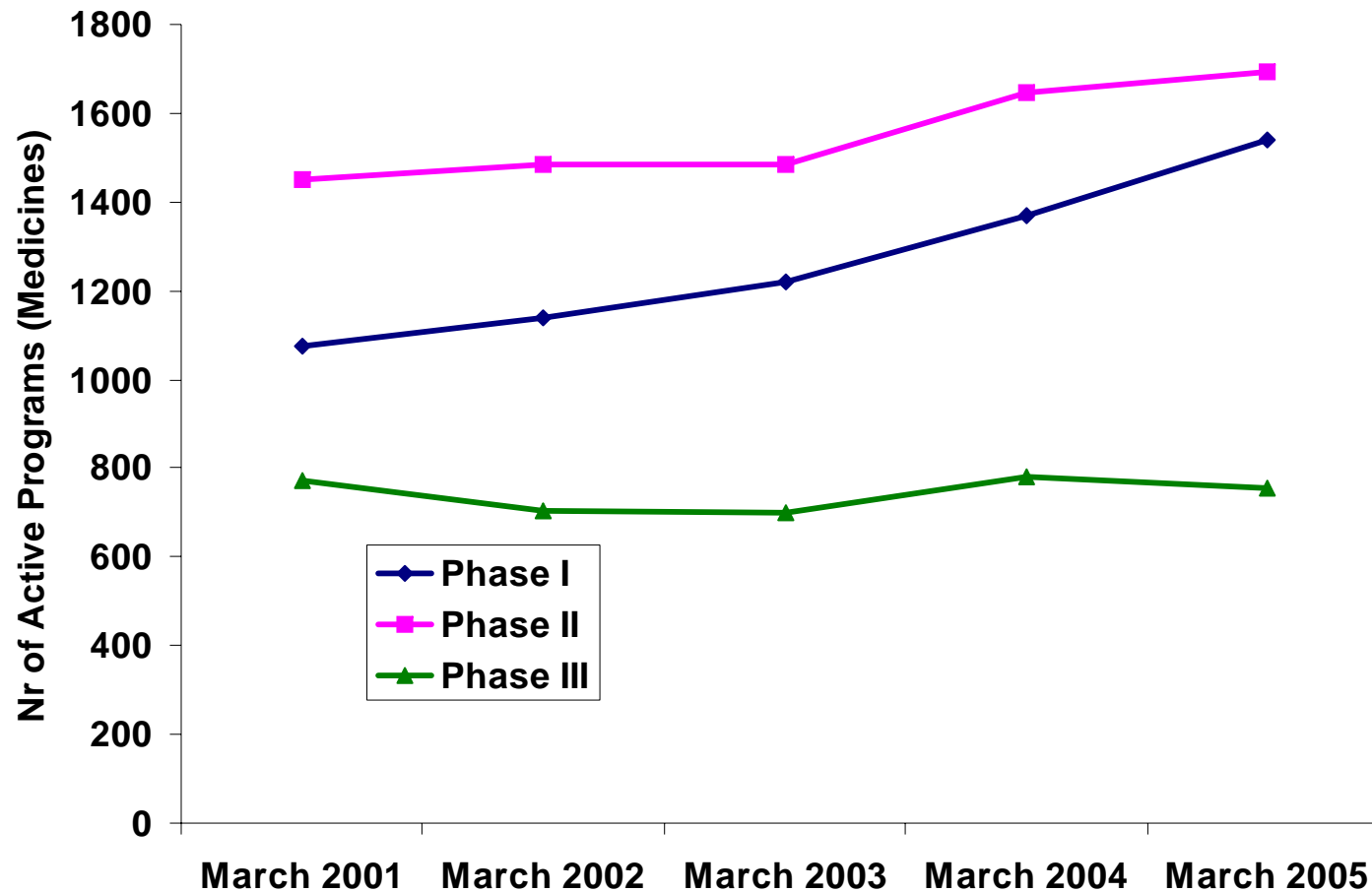


Source: Tufts Center for the Study of Drug Development

HOW TO INCREASE R&D PRODUCTIVITY?

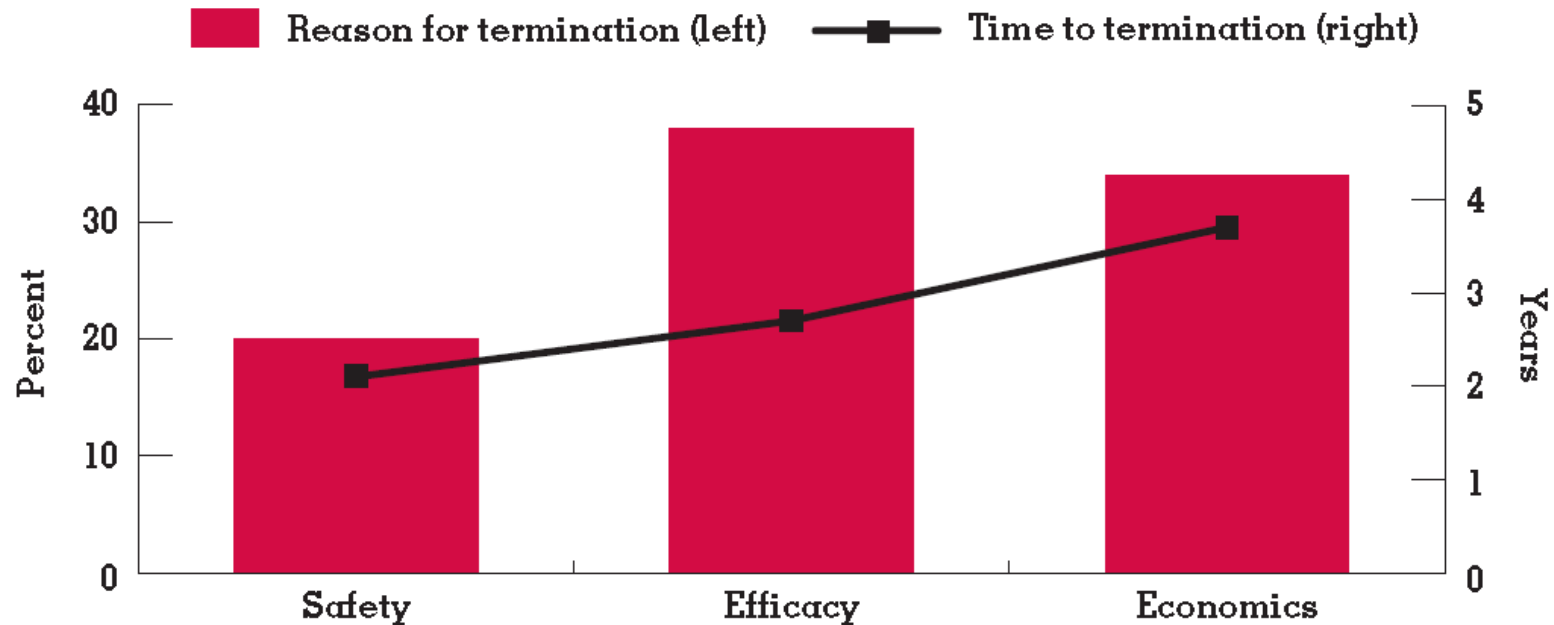
- **INCREASE OUTPUT**
 - Increase number of projects entering development
 - Reduce attrition
 - Increase in-licensing and acquisitions (no impact on *industry* output)
- **REDUCE COSTS**
 - Reduce attrition in Phases II & III
 - Increase speed
 - Reduce cost per patient

Nr. OF ACTIVE DEVELOPMENT PROGRAMS



Source: PARAXEL's Pharmaceutical R&D Statistical Sourcebook 2005/2006

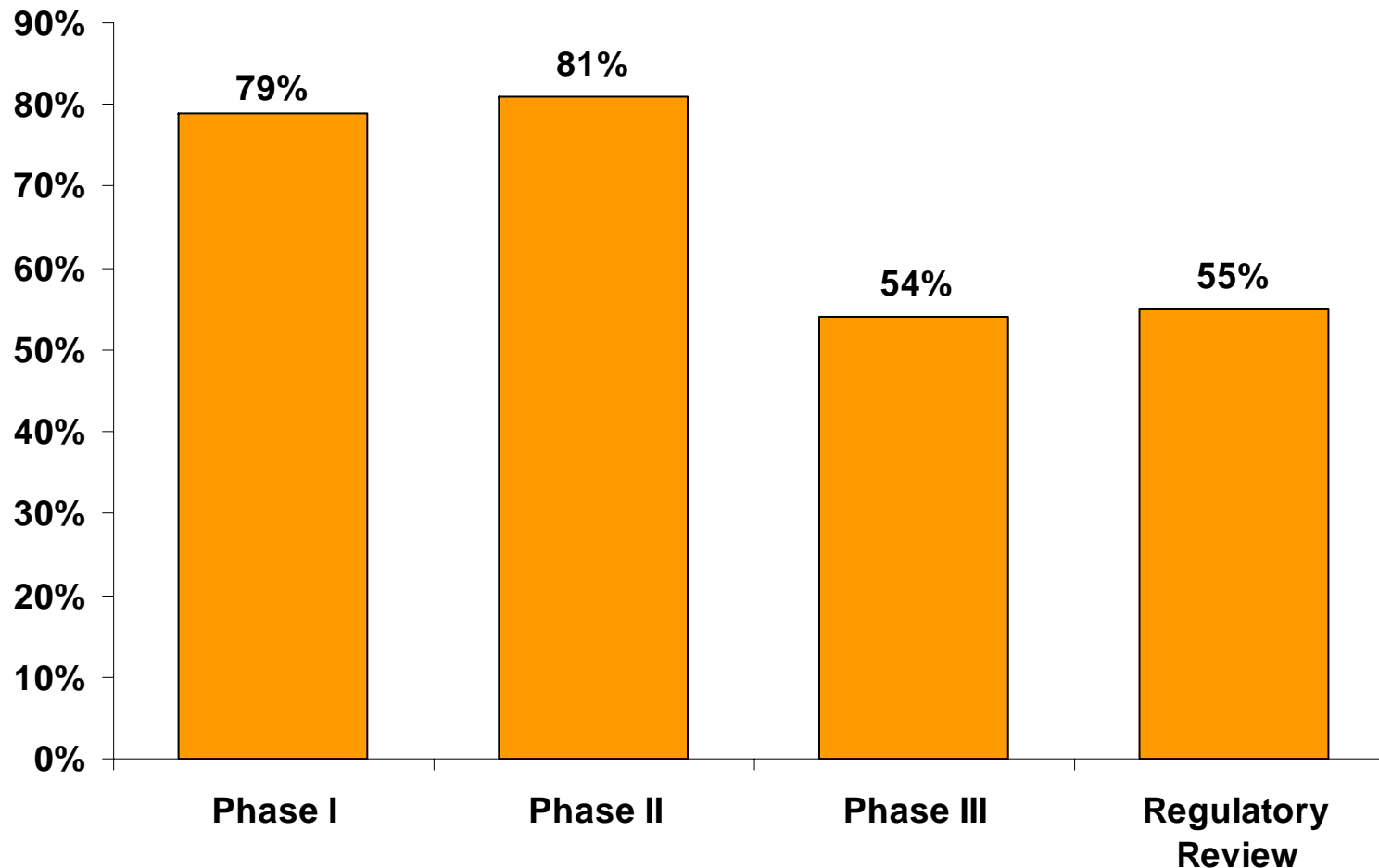
REDUCE ATTRITION



Source: Tufts Center for the Study of Drug Development

- **Early prediction of efficacy (proof-of-concept) and safety**
- **Portfolio management**
 - First-in-class; best-in-class; me-too; line extensions
 - R&D / strategy-marketing alignment

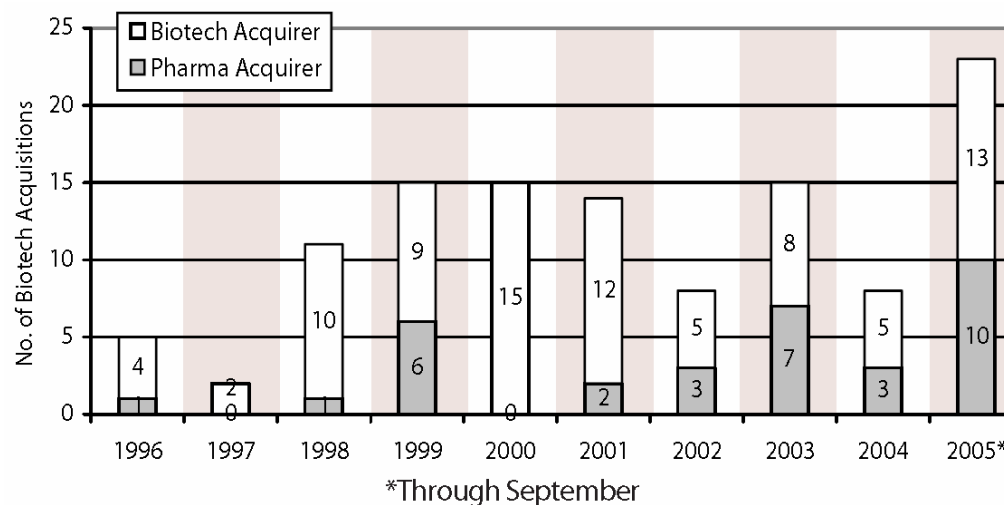
IN-LICENSING: New Active Substances - Share of Self-Originated Products



Source: CMR International 2004 R&D Factbook (Data for year-end 2003)

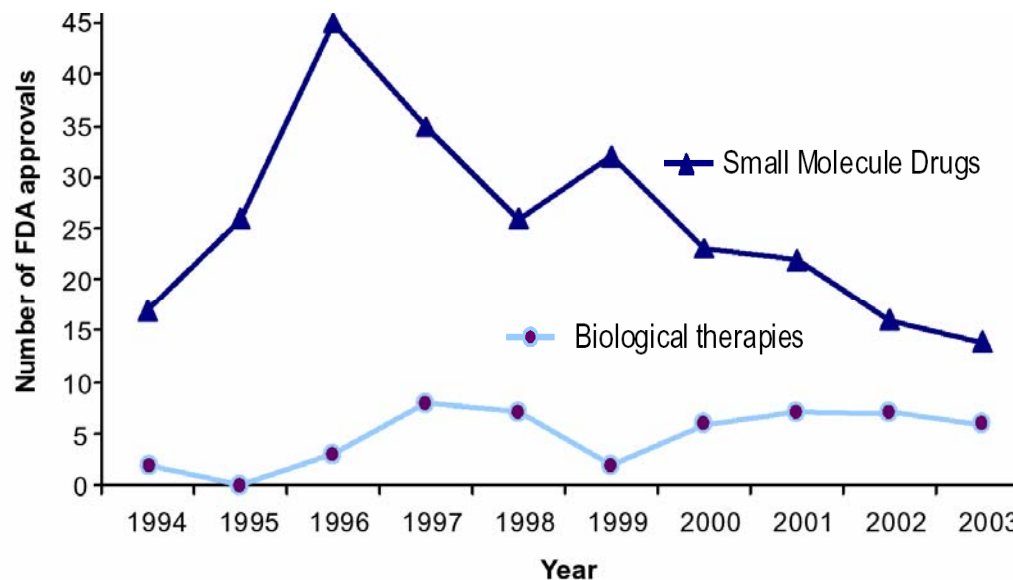
BIOTECHNOLOGY ACQUISITIONS

Biotechnology Acquisitions Valued at \$100m or more



Source: Winhover's Strategic Intelligence Systems

U.S. Approvals: Small molecule drugs and Biological therapies

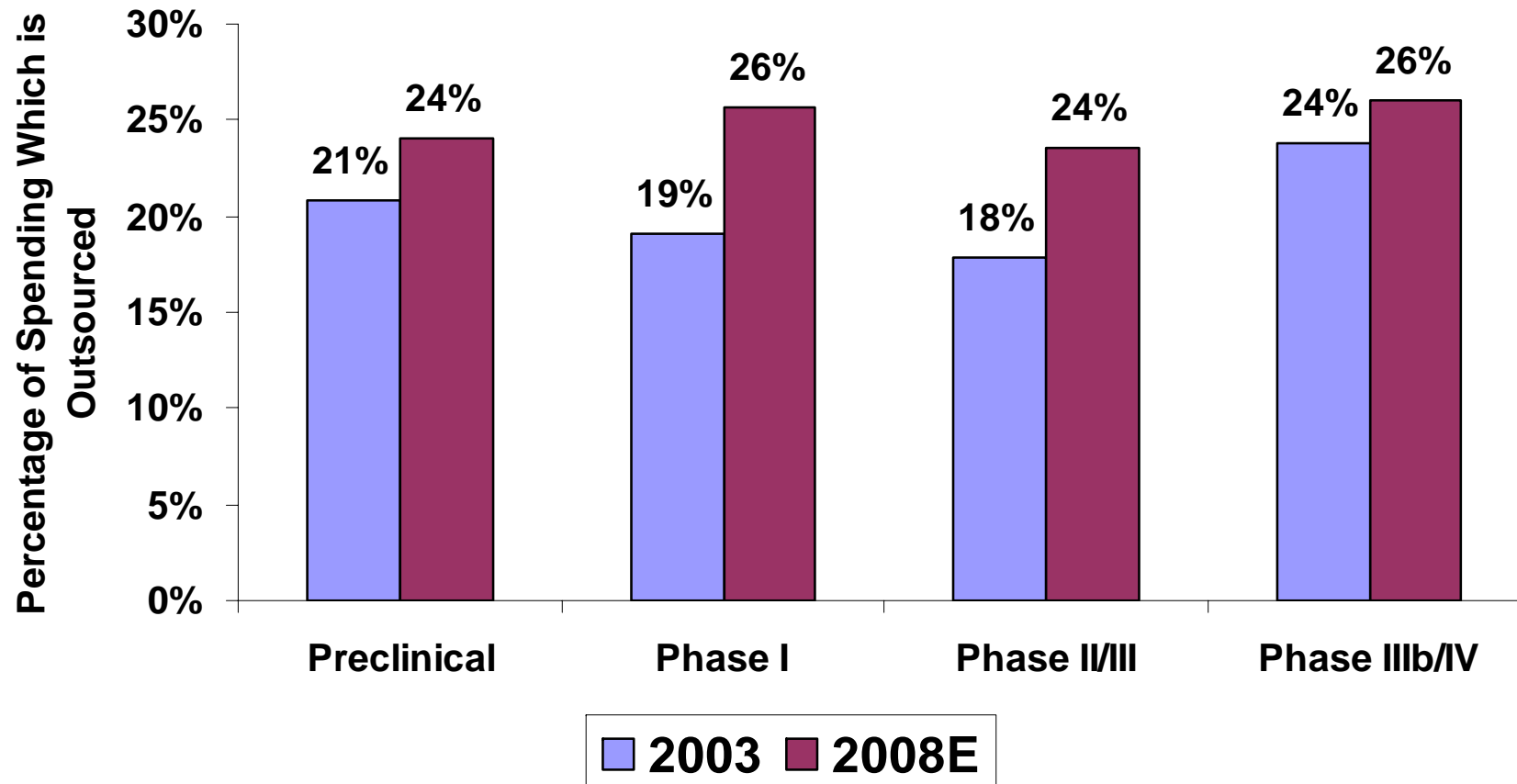


Source: Tufts Center for the Study of Drug Development

INCREASE SPEED AND FLEXIBILITY: R & D OUTSOURCING

Projects with high CRO usage stay closer to schedule and are completed faster.

Source: Tufts Center for the Study of Drug Development



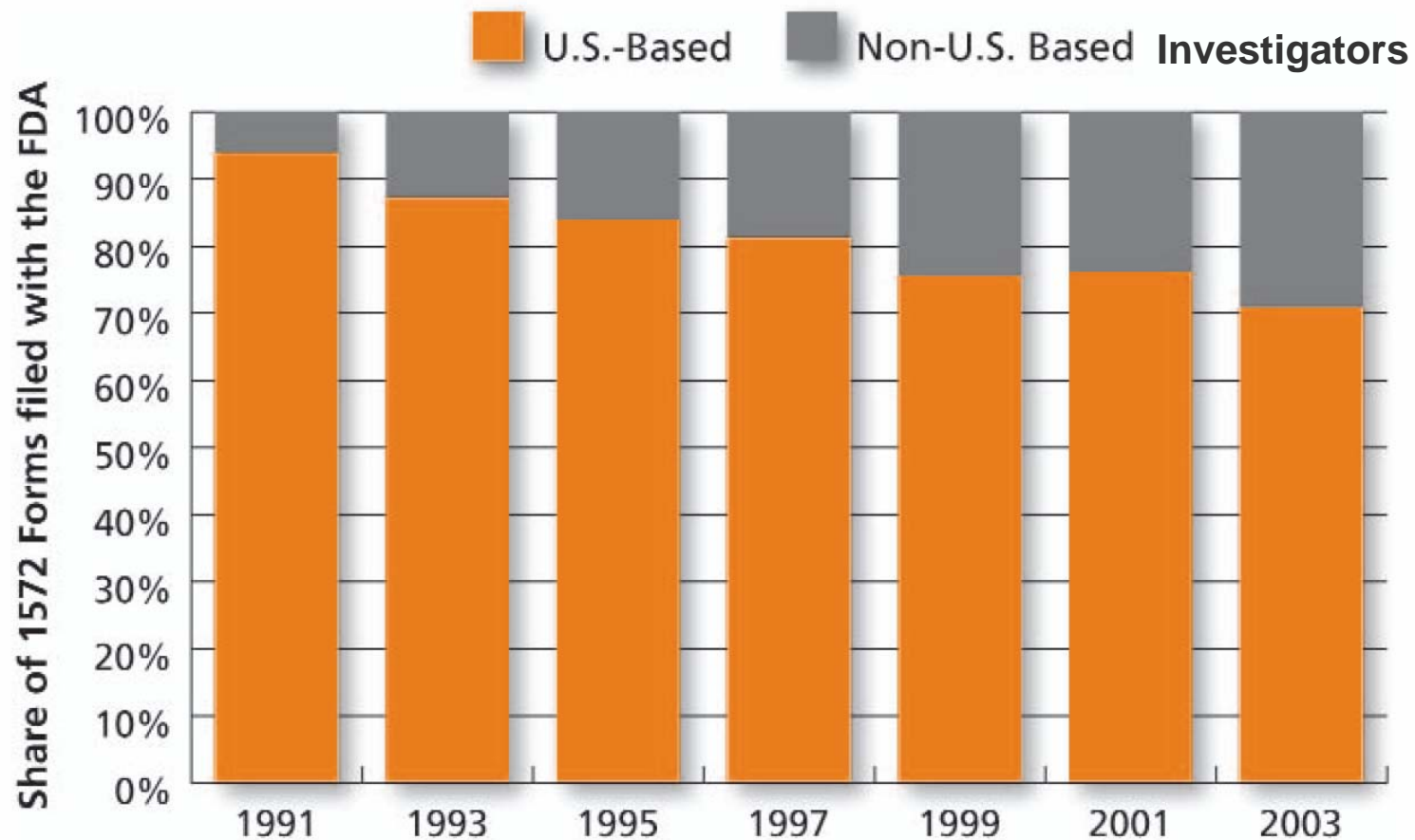
Source: Goldman Sachs; Jefferies & Co

THE VIRTUAL R&D ORGANIZATION

Example: King Pharmaceuticals

- **Vertically integrated pharmaceutical company: from discovery to commercialization**
- **2005 Sales: \$1.8b (+36%)**
- **2005 R&D: \$74m (4.2% of sales)**
 - **15 R&D projects**
 - including 3 in Phase III and 2 in Phase II
 - **Nr of R&D employees: 65**
 - **No R&D labs**
 - **R&D is outsourced to**
 - **Universities & Contract Research Organizations (CROs)**
 - **Key internal R&D competencies**
 - **Internal leaders: find, attract and manage suitable partners**
 - **Contract design**

LOWER COST PER PATIENT: Changing Location of Clinical Trials



Source: Tufts Center for the Study of Drug Development