

# Office of Technology Development

## **Boston Life Sciences Cluster and EU Collaboration**

June 20, 2014

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Managing Director



# Who am I?

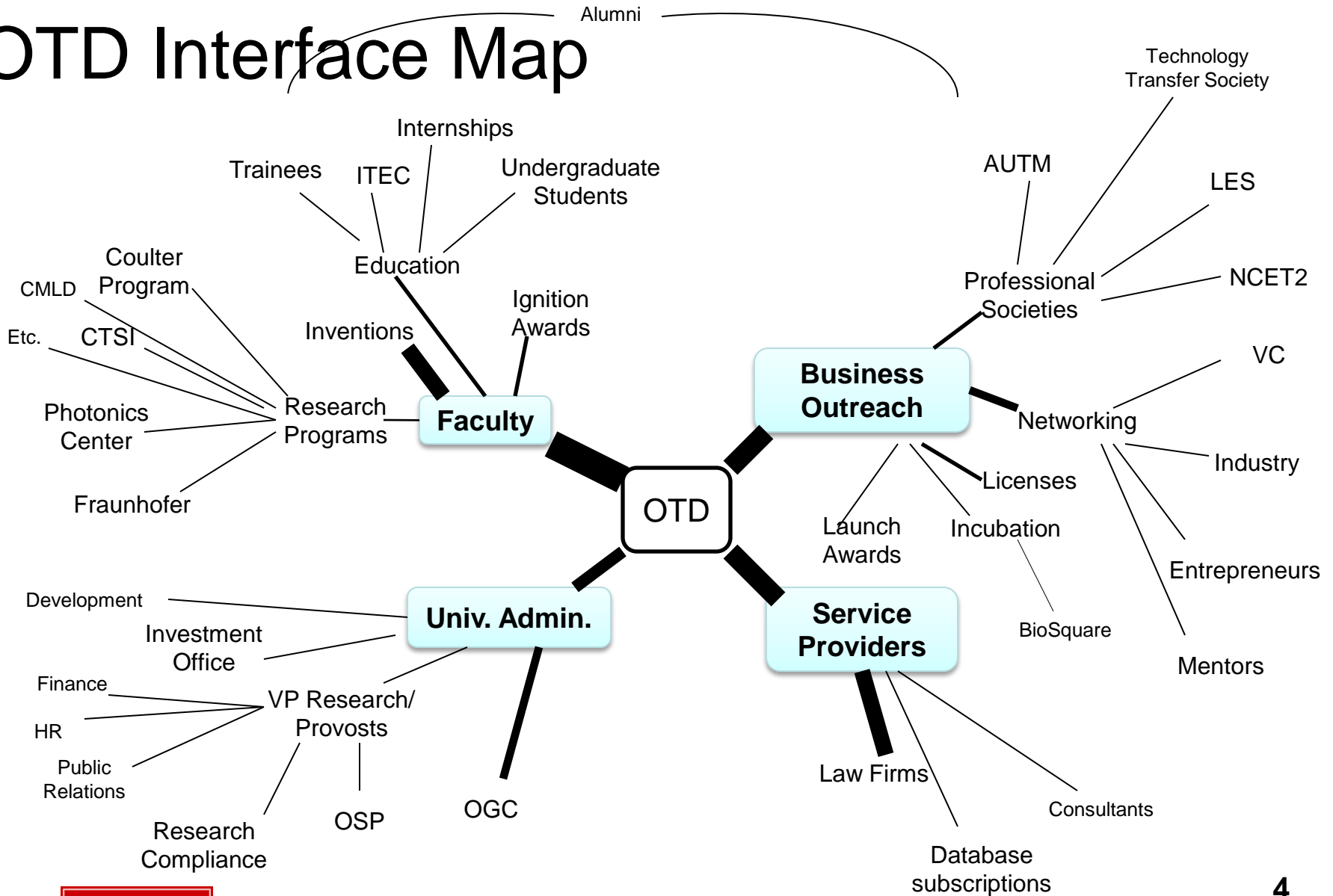
- Grew up in Canada and India, lived in Boston for 28 years
- BS Electrical Engineering, 1981 University of Waterloo
- Live in Cambridge, MA
- Five startups in 33-year career
  - Three as CEO
  - Five acquired
- Venture Partner for 2 years
  - Key Venture Partners (series C lead in fourth startup)
  - Sourced 220 deal opportunities and made one investment
    - Company was acquired in 2008 for \$430M
- Currently Managing Director, Office of Technology Development and lecturer at the Graduate School of Management
  - Have spun-off eight companies from BU
  - Have generated more royalty income in 4 years than 34 years cumulative prior to my joining
- Sit on six company and non-profit boards
  - BU Spin-offs: RayVio, Ensemble, Constant Therapy
  - BU Related: Mass Ventures, NAI, LearnLaunch

# A research institution at the scientific forefront...



- 2008 Nobel Prize winner (shared) in Chemistry
  - Osamu Shimomura, Ph.D.
- Over 1,000 sponsored research grants (NIH, DOD, DOE, etc) in 2006 with a particular of biomedical research and extensive new facilities
  - MIT \$640M
  - Harvard \$480M
  - BU \$370M
- Partner with Fraunhofer Gesellschaft to create the Boston University-Fraunhofer Alliance for Medical Devices
- Translational programs: Ignition Awards, Coulter Biomedical, NIH CTSI, Photonics Center, NIH Center for Future Technologies in Cancer Care
- Joined AAU in 2012
  - 62<sup>nd</sup> member

# OTD Interface Map

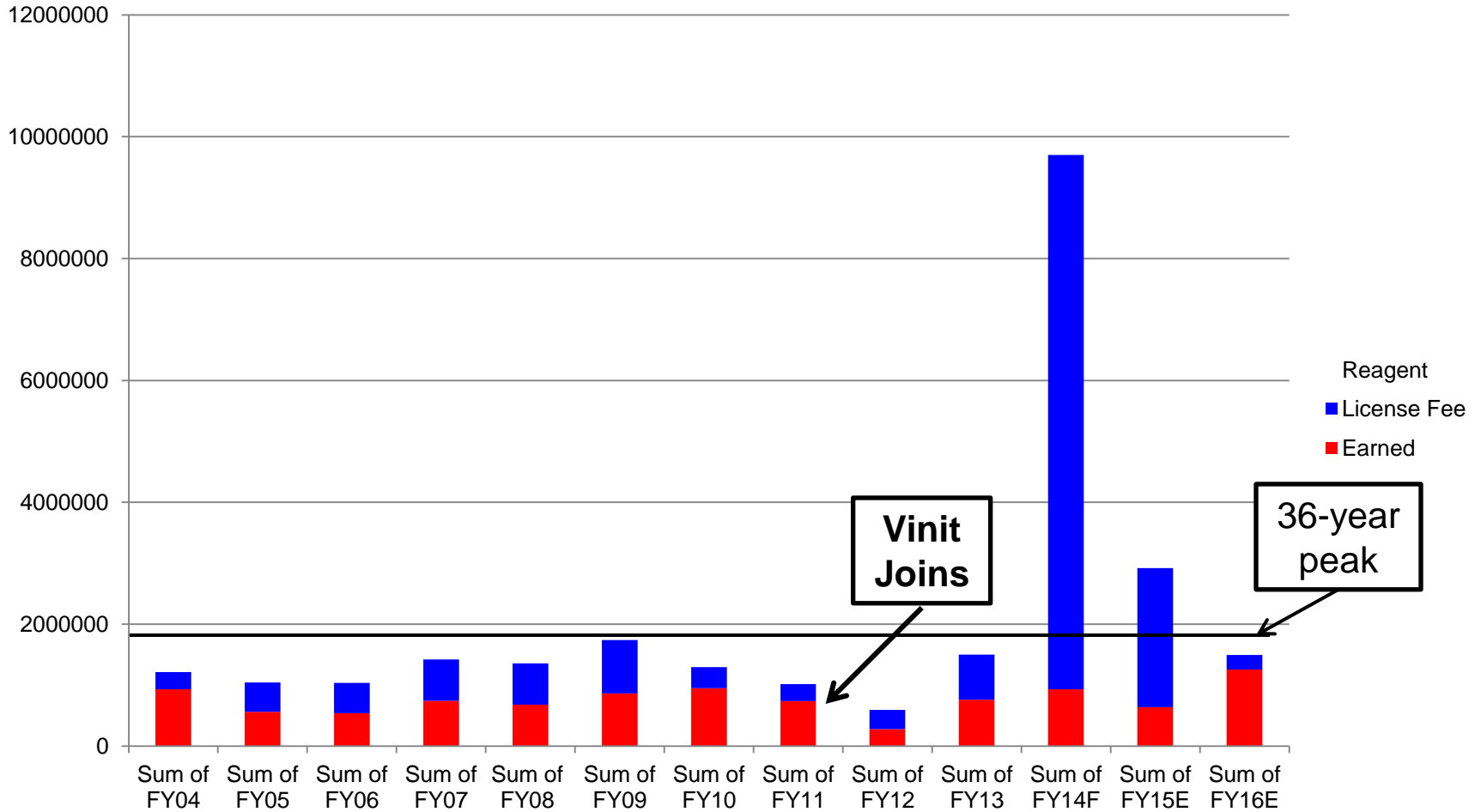


Thicknes of Line Indicates Level of Activity

# New Model OTD

- Motto:
  - Maximize collisions, Minimize friction<sup>SM</sup>
- Mission Statement:
  - Encourage, Educate and Enable (e<sup>3</sup>) BU Community to realize commercial potential of their ideas

# License Revenue with 2-year forecast



**Sustainable Revenue:** Earned + License Fee + Reagents

# OTD External Advisory Board



**Kathleen  
Healy**  
BU Overseer



**Eugene  
Hill**  
General  
Partner  
SV Life  
Sciences



**Robert  
Langer**  
Professor  
MIT



**Charles  
Lax**  
General  
Partner  
Grandbanks



**Doug  
Levinson**  
CEO  
Cytrellis Bio

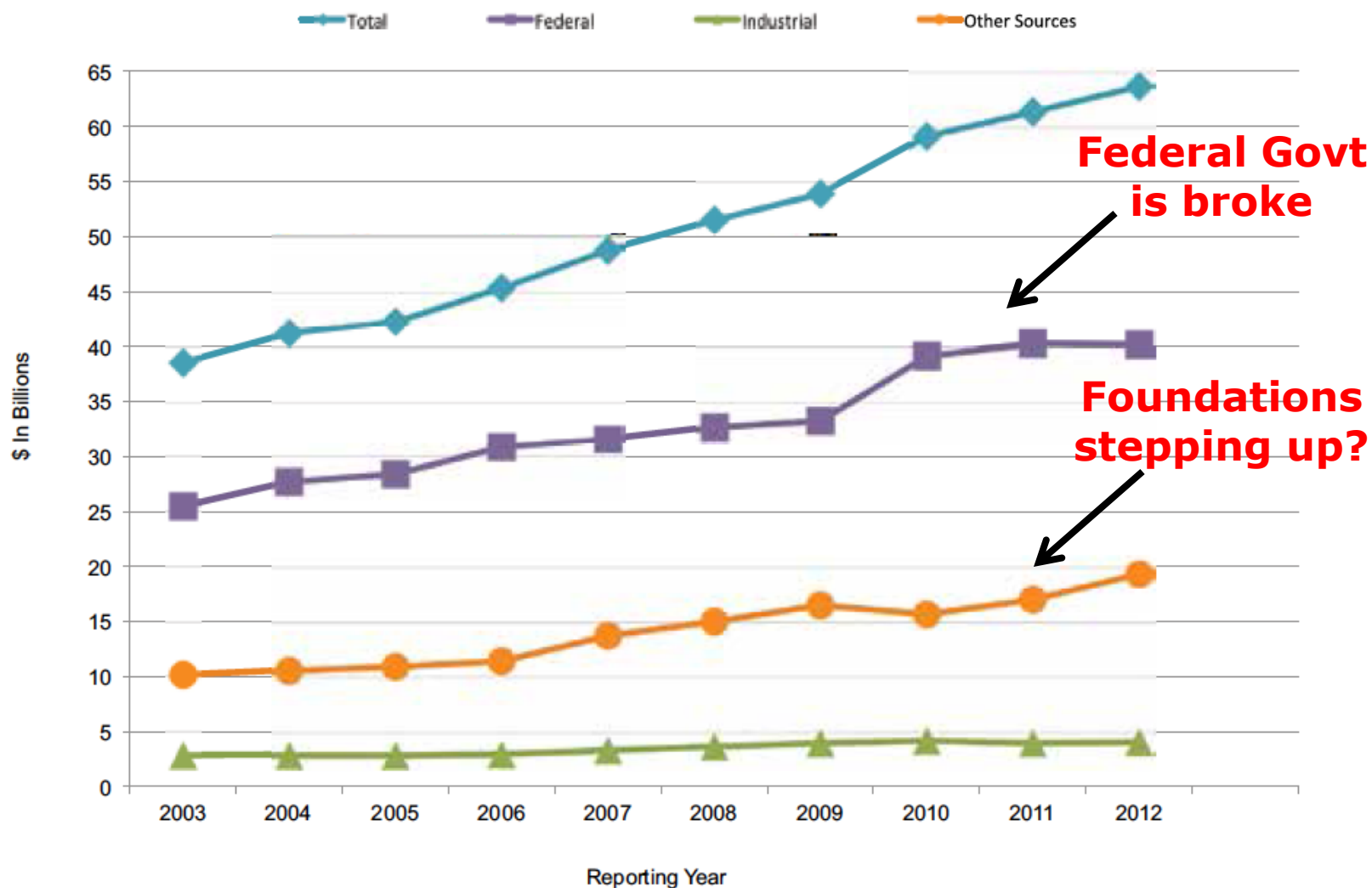
# Globalization of R&D

<b>Share of Total Global R&amp;D Spending</b>			
	<b>2009</b>	<b>2010</b>	<b>2011</b>
<b>Americas</b>	<b>39.1%</b>	<b>38.8%</b>	<b>38.4%</b>
<i>U.S.</i>	<i>34.7%</i>	<i>34.4%</i>	<i>34.0%</i>
<b>Asia</b>	<b>33.6%</b>	<b>34.8%</b>	<b>35.3%</b>
<i>Japan</i>	<i>12.6%</i>	<i>12.3%</i>	<i>12.1%</i>
<i>China</i>	<i>11.2%</i>	<i>12.3%</i>	<i>12.9%</i>
<i>India</i>	<i>2.5%</i>	<i>2.9%</i>	<i>3.0%</i>
<b>Europe</b>	<b>24.1%</b>	<b>23.3%</b>	<b>23.2%</b>
<b>Rest of World</b>	<b>3.1%</b>	<b>3.0%</b>	<b>3.0%</b>

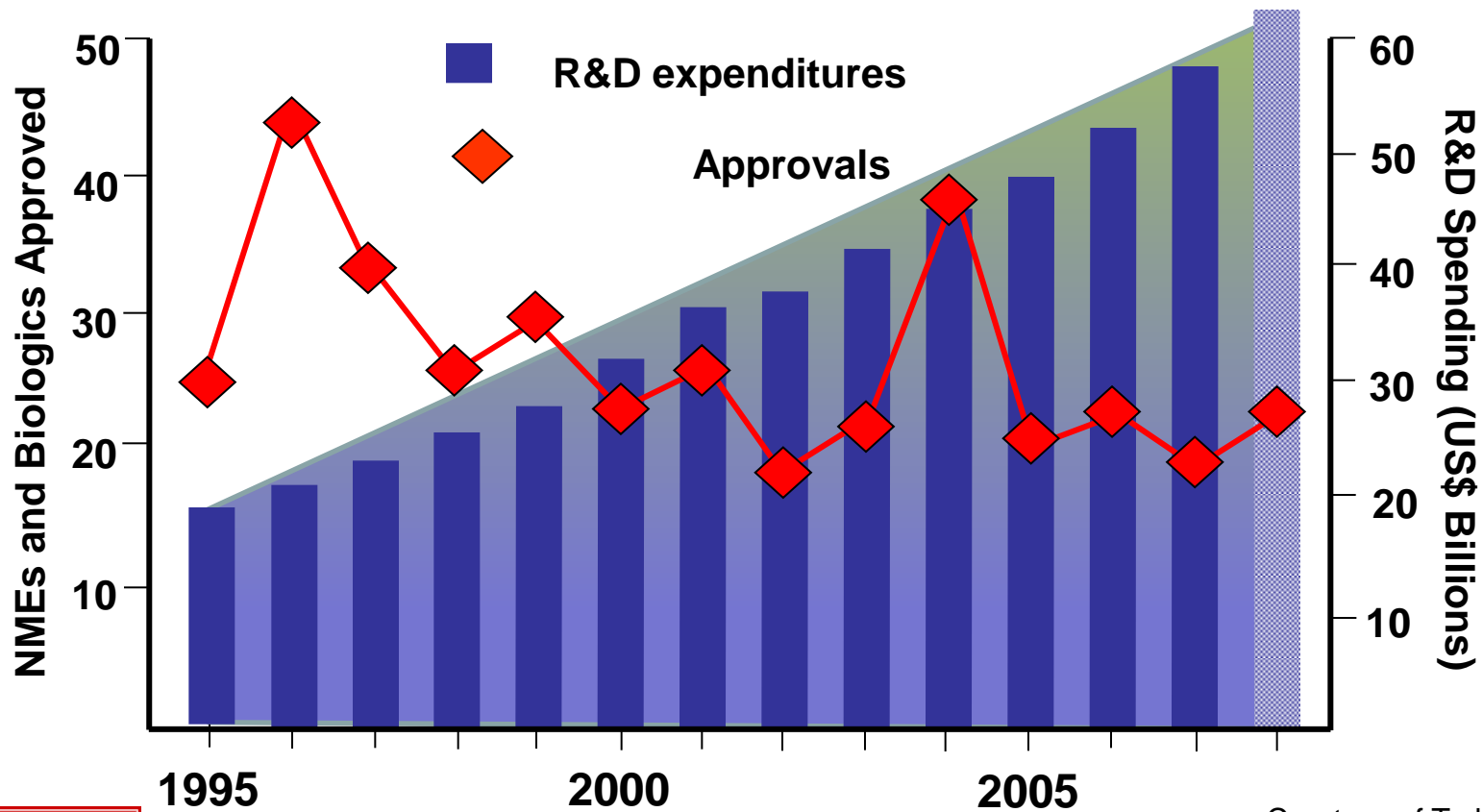
Source: Battelle, *R&D Magazine*



# US Academic Research Expenditures



# Pharma's Predicament



Sources: FDA/CDER, PhRMA, PricewaterhouseCoopers

Note: R&D spending from non-PhRMA companies not available

Courtesy of Ted Torphy, JNJ presented at Massbio Pharma Days

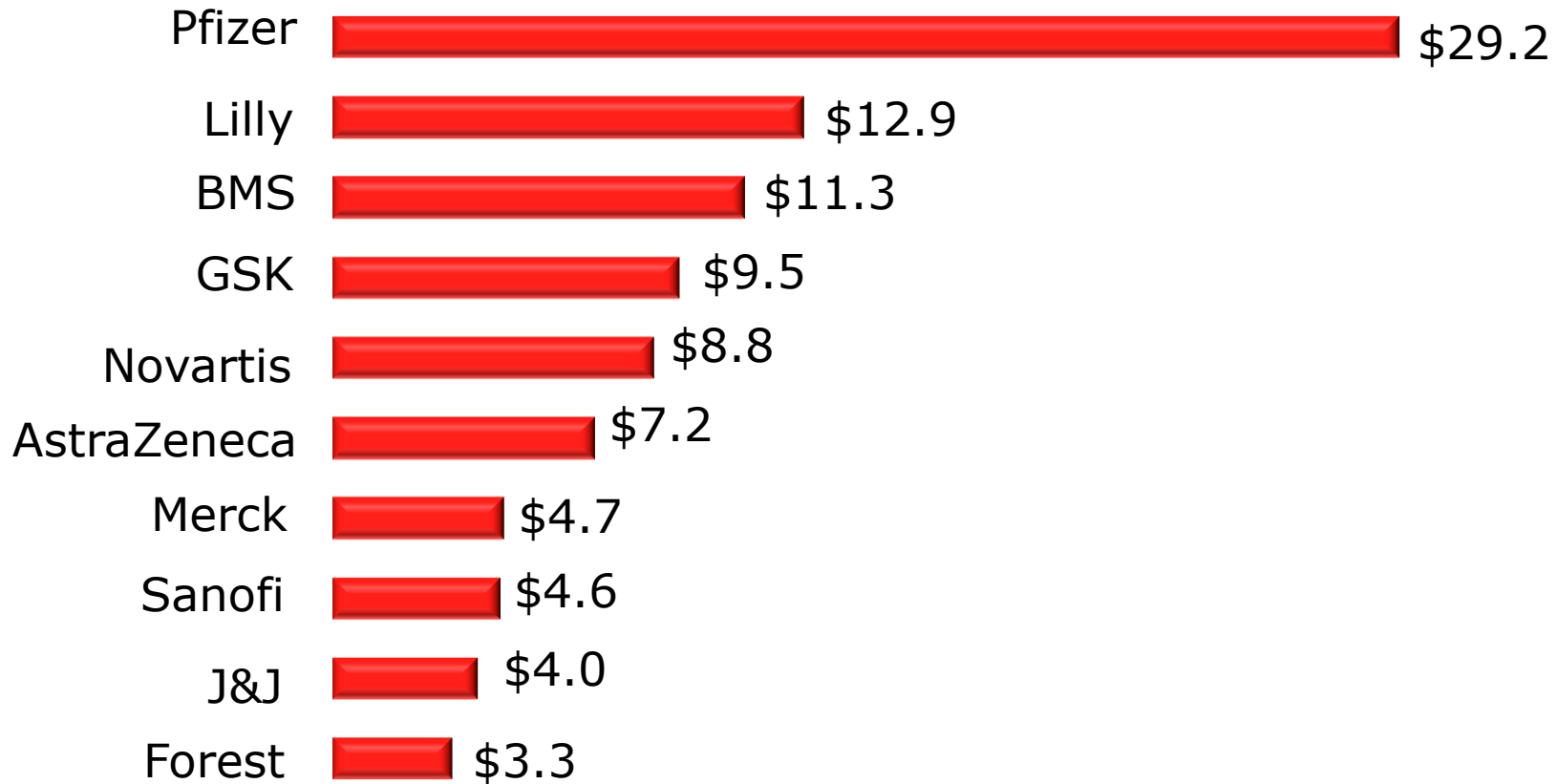
# Drugs coming off patent

2010		2011		2012		2013	
Product	2009 Sales (\$MM)	Product	2009 Sales (\$MM)	Product	2009 Sales (\$MM)	Product	2009 Sales (\$MM)
Aricept	\$3,991	Lipitor	\$12,535	Plavix	\$9,801	Cymbalta	\$4,660
Cozaar	\$3,561	Advair	\$7,794	Enbrel	\$6,575	AcipHex	\$2,728
EffexorXR	\$3,182	Zyprexa	\$4,916	Diovan	\$6,013	Humalog	\$1,959
Taxotere	\$3,034	Levaquin	\$2,648	Seroquel	\$5,126	Zometa	\$1,469
Protonix	\$2,052	Xalatan	\$1,737	Singulair	\$4,660	Niaspan*	\$853
Flomax	\$1,970	Concerta*	\$1,326	Lexapro	\$3,263	Lovaza	\$705
Arimidex	\$1,921	Femara	\$1,292	Avapro	\$3,088	Xopenex^	\$357
Gemzar	\$1,363	Xeloda	\$1,160	Actos	\$2,532	Zomig^	\$166
NovoSeven	\$1,320	Avelox	\$1,020	Viagra	\$1,892	Advicor^	\$80
Coreg^	\$253	Caduet	\$548	Avandia	\$724	Fuzeon^	\$26
<b>Total</b>	<b>\$22,647</b>		<b>\$34,976</b>		<b>\$43,674</b>		<b>\$13,003</b>

\*Year of first available generic

^US Sales only

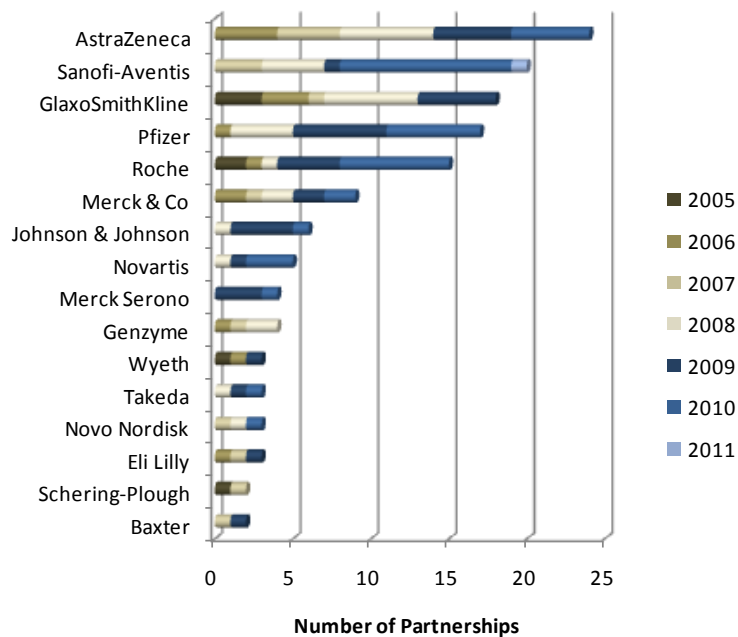
## Lost Revenues due to patent expiration 2010-2013



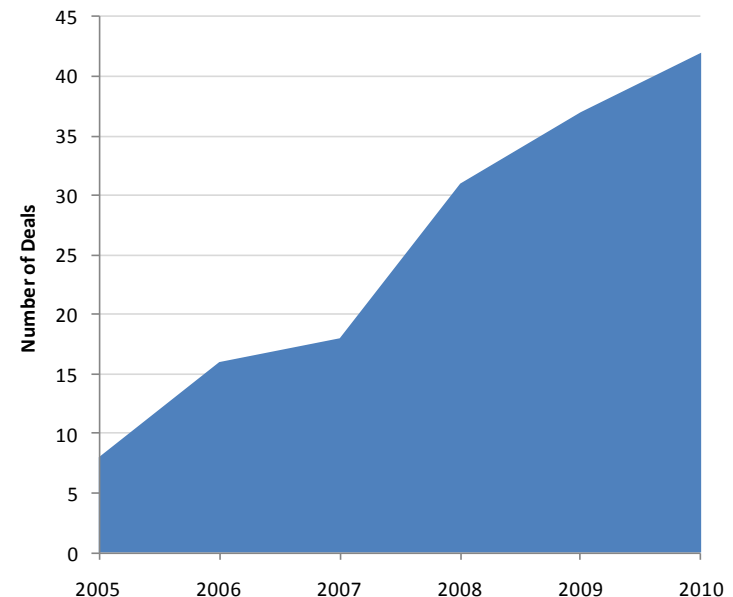
## Collaborations with academia have become much more frequent in recent years as pharma drives externalization of early-stage R&D

- AstraZeneca, sanofi-aventis, GSK, and Pfizer are the leading partners of academia over the last 5 years
- While overall industry alliances with academia have leveled-off over the last few years, collaborations initiated by large pharma/biotech have grown significantly since 2005

### Top Pharma/Biotech Collaborators with Academia



### Growth of Top Pharma/Biotech-Academia Alliances



- **Explosion in biological knowledge**
- **Increasing externalization of R&D by pharma**
- **Increasing push towards commercialization by academia**
- **VC shift towards later-stage investing**



\*Blue shades indicate recent partnerships (since 2009)

Notes:

- Source: Recap, Back Bay Life Science Advisors analysis
- Date range: January 1, 2005 – January 12, 2011
- Includes Top 100 Pharma/Biotech preclinical deals with academia only

# Biopharma Top 10 Countries

Inward direct investment drug and pharma 2007-2010  
(\$ billions)

United States	\$73.3
China	\$29.8
Singapore	\$17.7
India	\$16.8
Ireland	\$16.0
Italy	\$13.1
Germany	\$11.9
Switzerland	\$11.1
Canada	\$9.9
Brazil	\$8.9

# Boston #1 Life Science Cluster in US

- Life Science Employment: 113,680 or 6.2% (17.5% growth)
- Science and Engineering Students (per 1,000): 28.7
- NIH funding (in millions): \$2,235.9
- State R&D spend (as % of GDP): 7%
- Research facilities (millions square feet): 6
- VC funding (in millions) \$1,142

# Mass Life Sciences Center

- Established 2008 with 10-year \$1B commitment
- Instrumental in making Mass #1 in life sciences research
- International Collaborative Industry Program (ICIP)
  - Research phase Grants of \$75,000-\$400,000
  - Industry collaborators will be funded by respective agency
  - Regions
    - Alsace France, Medicon Valley Scandanavia, Israel, Quebec, Victoria Australia, Wallonia Belgium
- International Partnership Assistance Portal



# Case Study: Diagnostic for Kidney Disease

- Principal Investigator: David Salant
- Collaborator: Gérard Lambeau (Univ of Nice/CNRS)
- Disease: Membranous nephropathy kidney disease
- Market: 1 to 1.5% of the population presenting with proteinuria, a common symptom of idiopathic membranous nephropathy, a condition affecting 1.3-2% of those patients.
- Diagnostic: Anti-PLA2R Antibody detection replaces invasive kidney biopsy (rarely performed)
- Exclusive Worldwide Licensee: EuroImmune (Germany)
- Feedback:
  - CNRS/FIST extremely difficult to work with
  - 3 Years to negotiate license

# Case Study: Therapeutic for Breast Cancer

- Principal Investigator: David Sherr
- Disease: Breast cancer and other solid tumor cancers
- Market: \$8.7 billion (worldwide; 1.3 million women) and \$3.7 billion (U.S.; 300,000 women)
- Therapeutic: A toxic targeted therapeutic for breast cancer at any stage and other tumors
- Exclusive Worldwide Licensee: Hercules (Netherlands); Newco JV BU & DDF
- Feedback:
  - Dutch lawyers unfamiliar with US university licensing
  - Quirkiness of Dutch law
  - 1 Year to negotiate license

# Questions?

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