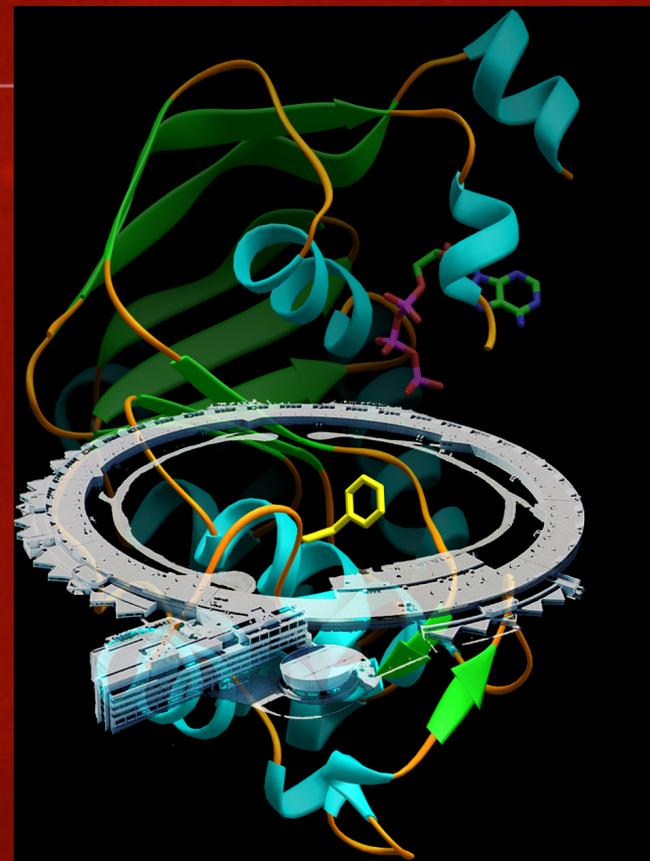


DOE X-ray Light Sources and Pharmaceutical Discovery

Stephen R. Wasserman

Global Structural Biology
Eli Lilly and Company

Commission to Review the Effectiveness of the National Energy Laboratories
November 4, 2014



Lilly Research Laboratories

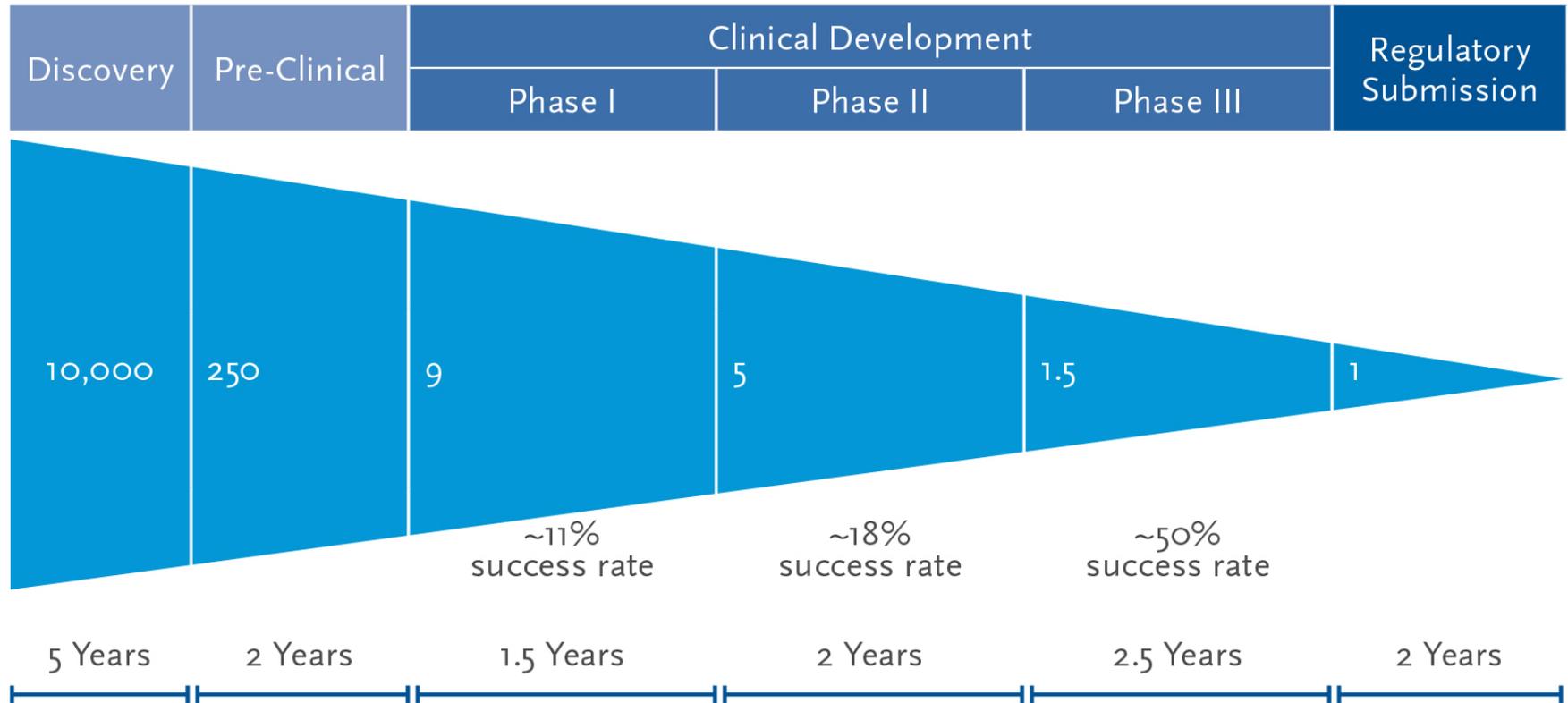
Structural Biology



Chemistry



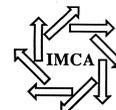
Pharmaceutical Development



- Strategic Portfolio Management & New Influencers in R&D Decision-Making
- <https://www.quintiles.com/assets/0/111/118/233/1336/313de5b8-3332-4bf5-a654-f2396c58e231.pdf>

Pharma at the Advanced Photon Source

- mid-1980's
 - Pharma companies discuss
 - Lilly and Upjohn
- 1990
 - IMCA founded
- March 15, 1991
 - IMCA-CAT Proposal
- 1996: First light



PROPOSAL TO ESTABLISH A COLLABORATIVE ACCESS TEAM

Submitted to the

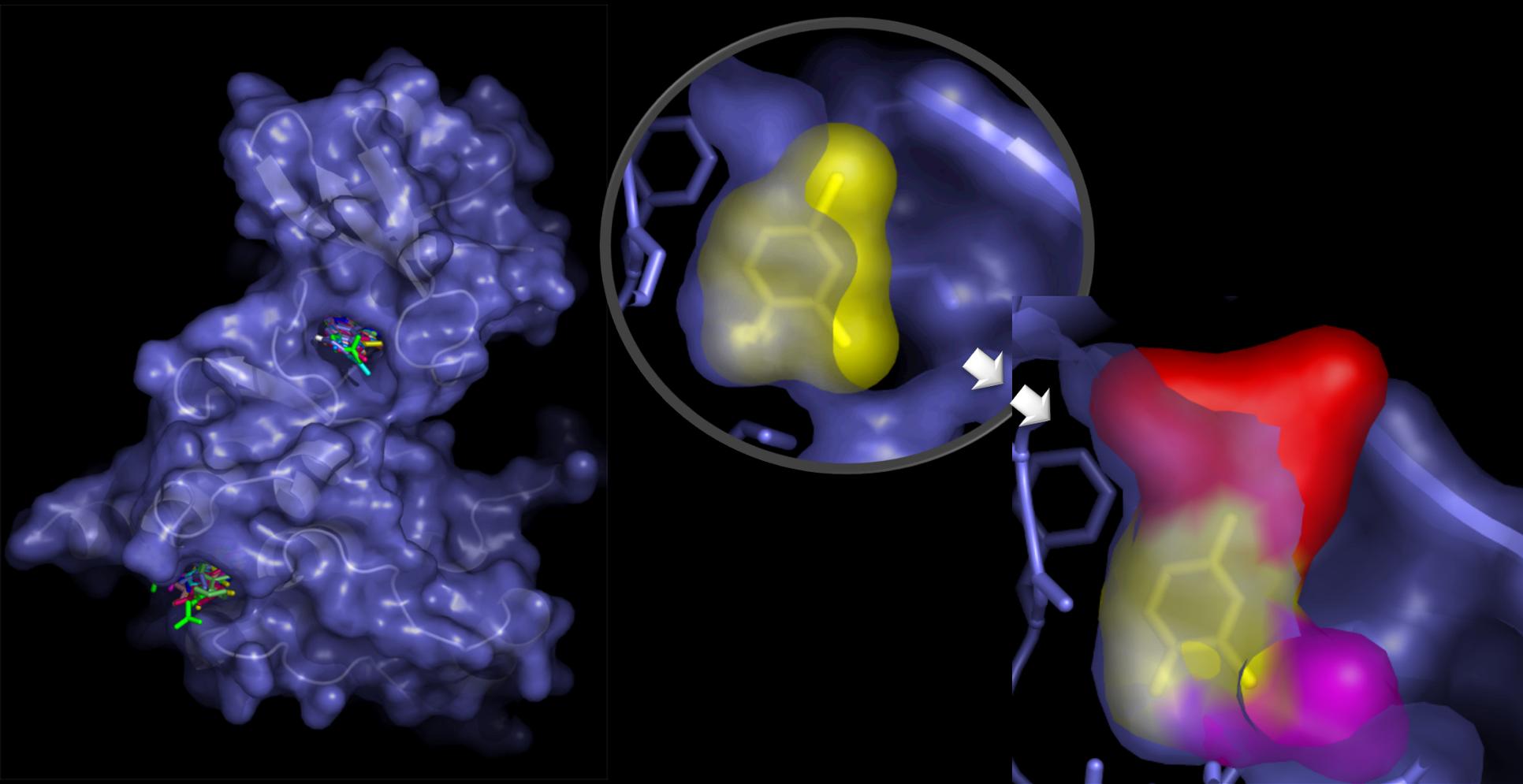
Proposal Evaluation Board of the Advanced Photon Source

by the

Industrial Macromolecular Crystallography Association

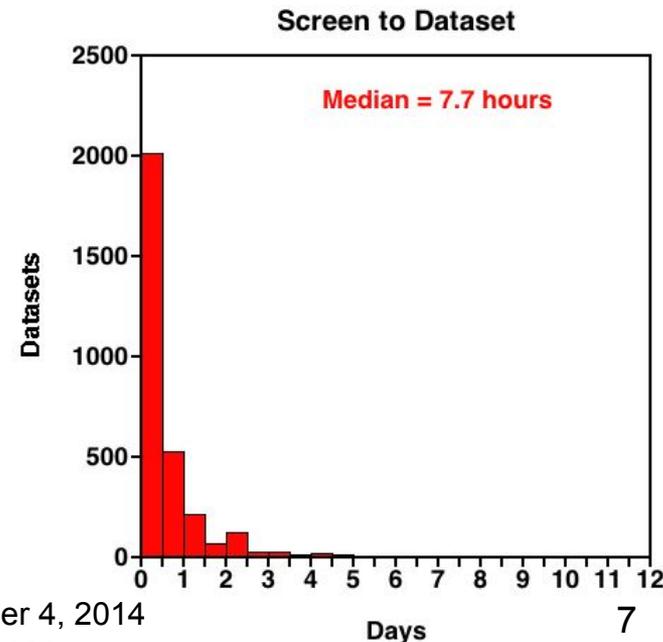
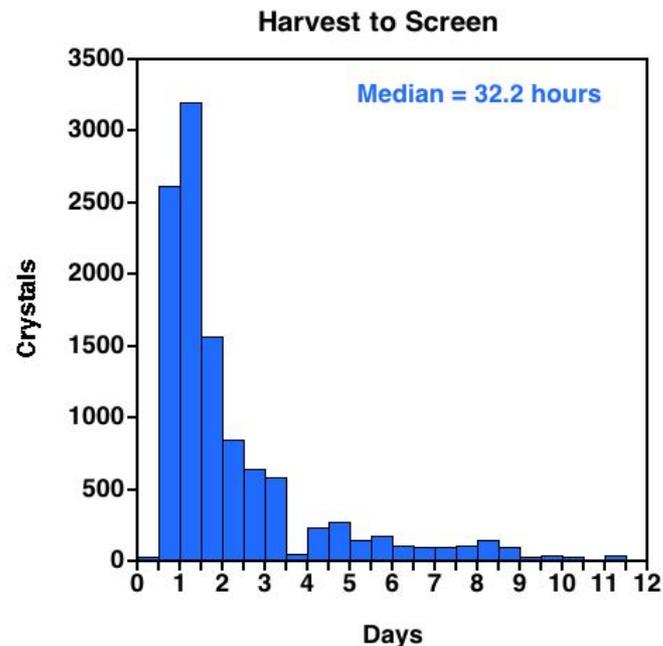


Structure guided design



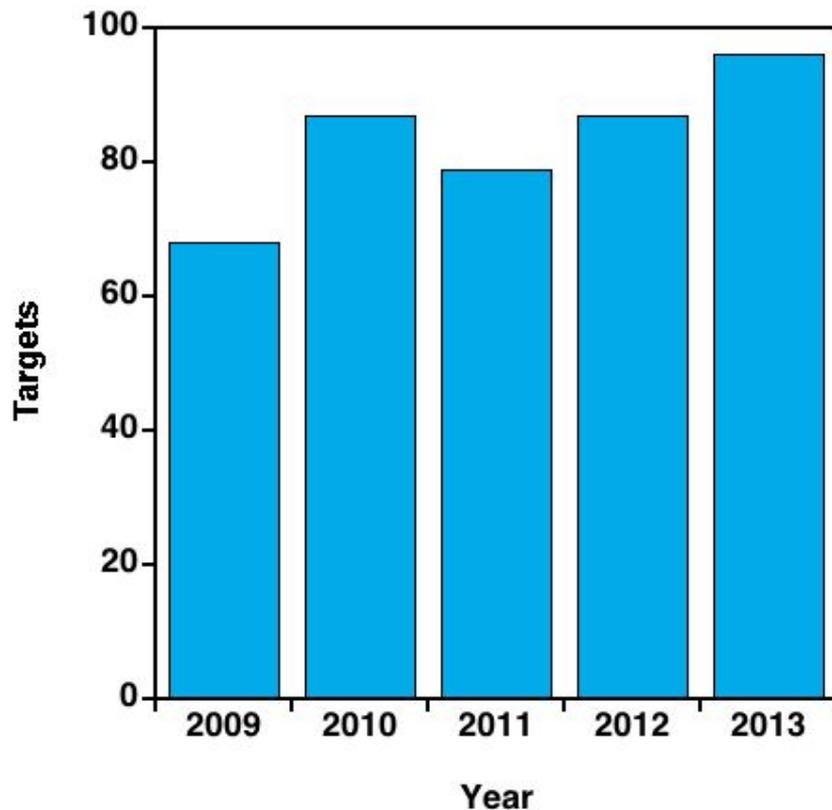
Sample Turnaround

- Median time to evaluate a crystal after its creation: 32 hours, including ~16 hours to ship the sample
 - Lilly crystals, 2013
- Median time to collect a dataset after creation of a crystal: 40 hours, including time to ship

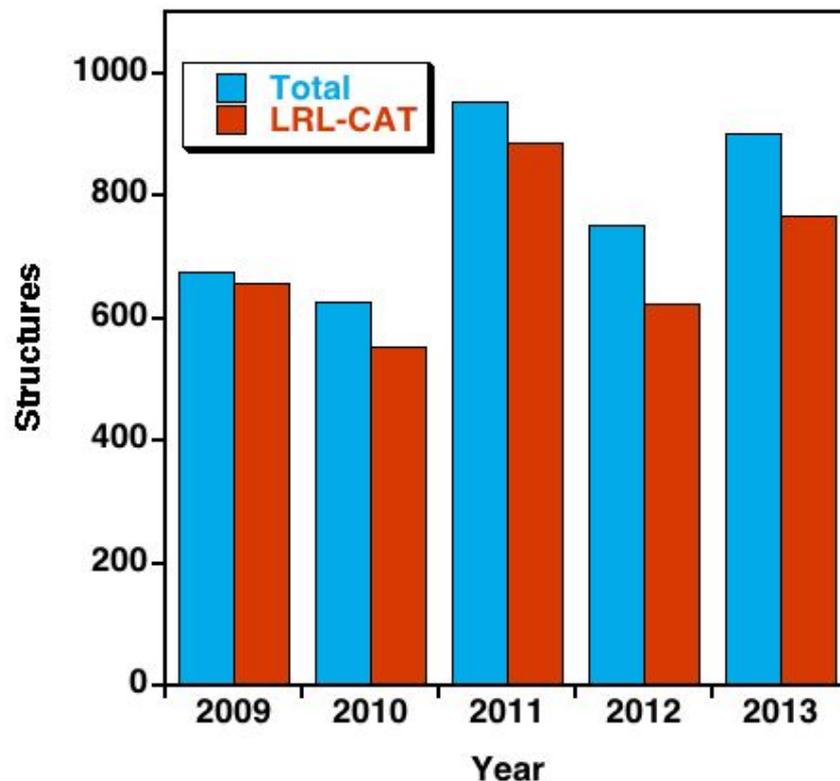


Lilly: Protein Targets and Structures

Protein Targets

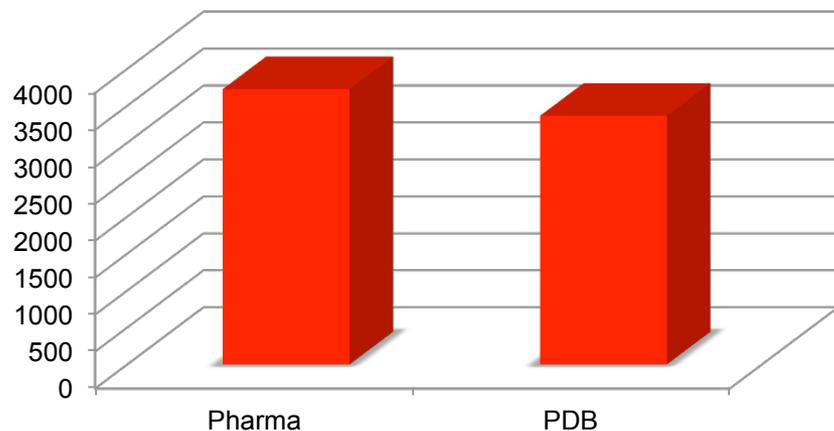


Structures

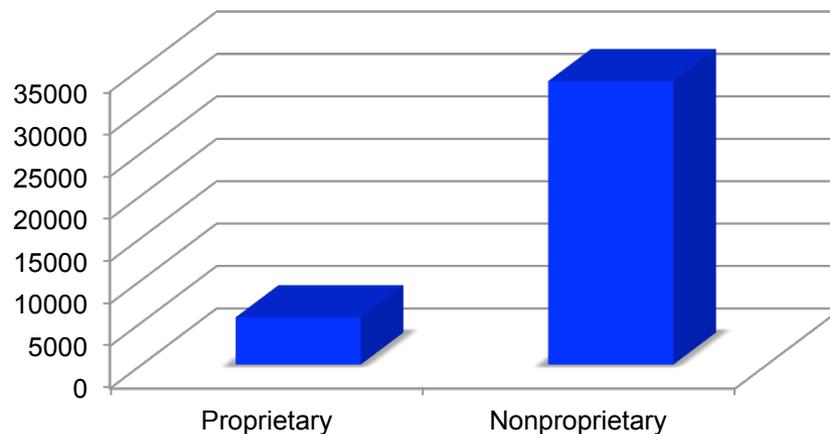


Productivity at US Light Sources

Structures (2012)



APS Hours (FY2013)



- Structures from survey of US pharmaceutical research (10 companies)
- Hours for Macromolecular Crystallography (MX) at the APS

Industrial User Support

- Dedicated Industrial Staff
 - Diamond Light Source (UK): 7
 - ESRF (France): 6
 - Canadian Light Source: 7 staff
- Full Service available
 - Staff support does not affect intellectual property
- DOE: “Limited non-collaborative support services”

Intellectual Property

- **Diamond Light Source (United Kingdom)**
 - “DLS hereby agrees to assign and hereby assigns to the Customer the Intellectual Property Rights in the Results.”
- **ESRF (France)**
 - “ESRF hereby assigns to <customer> all property rights, title, and interest (including Intellectual Property Rights) to the Work Product and Deliverables.”
- **Canadian Light Source**
 - “CLSI hereby assigns to <customer> all Intellectual Property Rights to the Work Product and Deliverables.”

Contract terms presented with permission of DLS, ESRF, and CLS

Intellectual Property

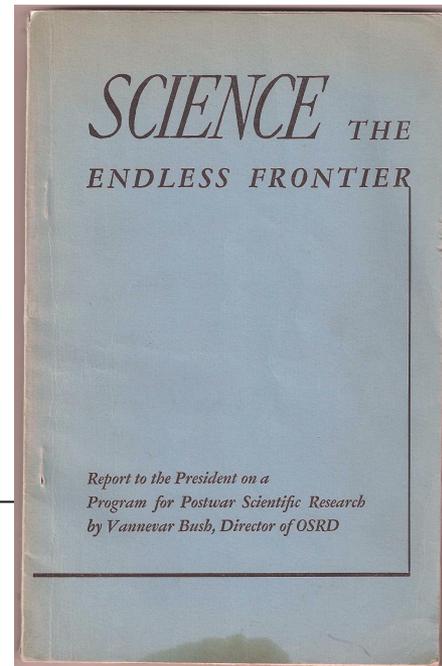
- DOE Master User Agreement

- “With respect to any Subject Invention reported and elected..., User may elect to obtain the entire right, title and interest in any patent application files in any country on a Subject Invention and in any resulting patent secured by USER.”
- “If USER wishes to elect title to the Subject Invention, a notice of election should be submitted with the report or within one year of such date of reporting of the Subject Invention.”

Vannevar Bush

Science the Endless Frontier 1945

“Research involving expensive capital facilities beyond the capacity of private institutions should be advanced by active Government support.”



US Synchrotron Users: Pharmaceuticals

Novartis



Genentech



Merck



Pfizer



Lilly



Glaxo SmithKline



BMS



Takeda



Amgen



AbbVie



Gilead



Vertex

