

Life of a Stanford Invention

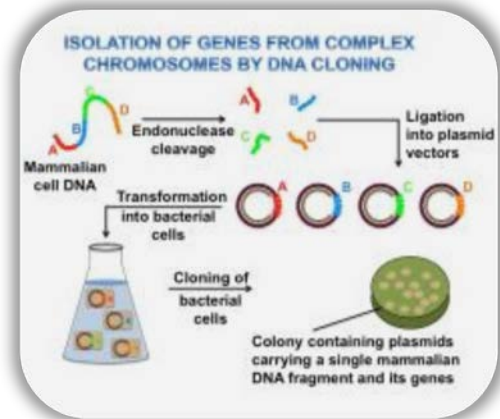
Notable Stanford Inventions



Functional
Antibodies



FM Sound
Synthesis



Recombinant
DNA



Google

Timeline of Stanford Inventions Big Winners

- 1970 – OTL Established
- 1971 – FM Sound Synthesis (\$22.9M)
- 1974 – Recombinant DNA (\$255M)
- 1981 – Fiber Optic Amplifier (\$48.4M), MINOS (\$4.4M)
- 1984 – Functional Antibodies (\$628M)
- 1990-1992 – Discrete Multi-tone Technologies for DSL (\$29.6M)
- 1996 – Improved Hypertext Searching - Google™ (\$343M)
- 2001-2003 – Data Visualization Software (\$14.8M)
- 2002 – Code Error Detection Software (\$11.4M)
- 2011 – Cancer testing (\$3.6M)

- **What's coming next?**

Timeline of Stanford Inventions High Impact

- 1973 – MEDIPHOR drug interaction software
- 1987-90 – Cantilevers Atomic Force Microscopy
- 1993 – MIMO for Wireless Broadcast
- 1995-97 – Cell lines for cancer and stem cell research
- 1997-98 – Cavity Ring Down Spectroscopy for precise gas detection
- 2001-07 – Treatment for Celiac Disease
- 2003 – Software to evaluate HIV therapy
- 2005 – Shoe design to prevent arthritis
- 2010-2012 – Education Program for Gifted Youth
- 2011 – Compassion training
- 2012 – Natural language processing software



Stanford inventions begin as nascent ideas supported by over **\$1.5 billion per year** of funding for research across 7 schools and SLAC.

Big Picture

Stanford Budget FY16-17:

\$5.9B Total

\$1.6B for research

\$951M of gifts (FY17)

\$22.4B Endowment

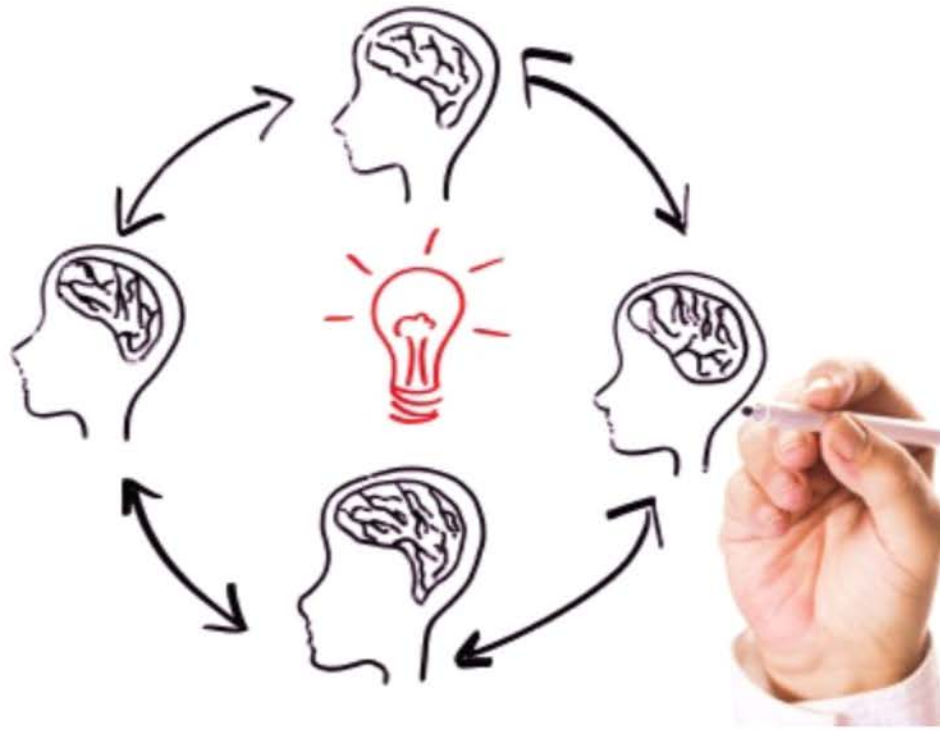
OTL \$45.4M income in FY17



Stanford has over **16,000 students** and over **2,100 faculty** members that teach and conduct research.



How are Stanford innovations transferred to others to develop into new products and companies?



Most research is transferred through...

graduate students, publications, seminars, faculty consulting, industry sponsored research and industrial affiliate programs.

Background: Stanford Intellectual Property Policies

SU18 – Stanford University Patent and Copyright Agreement

Patent policy- University takes title to all inventions created with **more than incidental** use of university resources

Copyright policy - University takes title to copyrightable works created with **significant** university resources

The Office of
Technology
Licensing (OTL) is
responsible for...

the formal transfer of
patents, copyrights,
certain educational
material, data and other
technology through
license agreements.



OTL's Mission:

To promote the transfer of Stanford technology for society's use and benefit while generating unrestricted income to support research and education.



Most Inventions are Never Licensed

9-10 invention
disclosures/week

50% have patent
applications filed

20-25% are licensed*

*some inventions such as software
and biological materials are licensed
without patent protection



Disclosures

Then. . .

28 in 1970

Now. . .

521 in 2017

11,852 cumulative

How Does OTL Decide?



Licensing teams try to decide which inventions can make an **impact**.

Questions

Is the invention evolutionary or revolutionary?

What is the stage of development?

Is it patentable and could a patent be enforced?

What is the potential market size?

What is the inventor's track record?

Licensing Teams* Decide Patent and Licensing Strategy



*Licensing Associate and Liaison teams have technical degrees and are market focused.

"Cradle to Grave"

Evaluate overall potential

Develop intellectual property strategy and manage patent prosecution

Determine when and how to market and license the invention

Negotiate contracts

Maintain and amend agreements

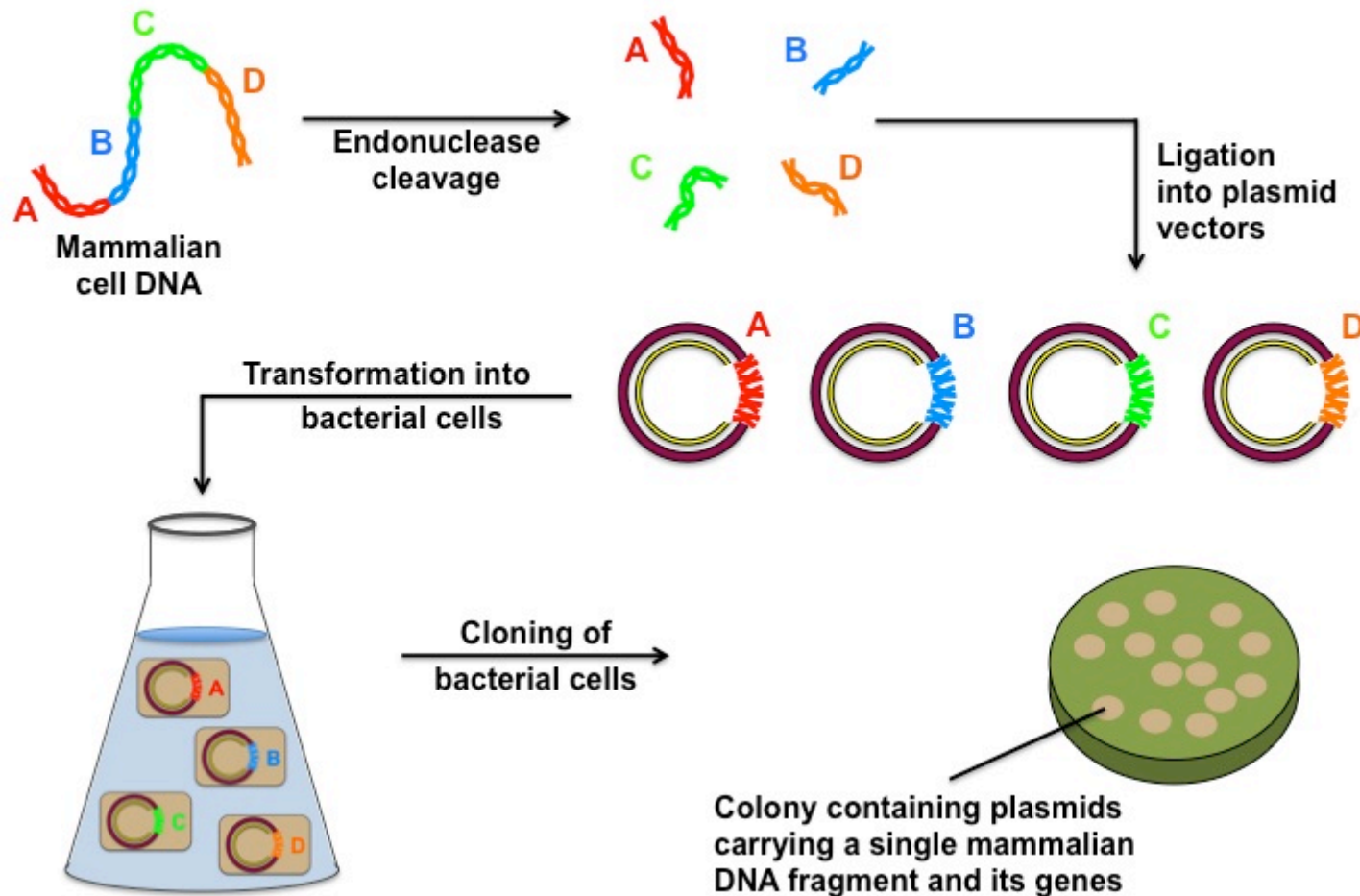
Monitor development and commercialization and track royalty payments

OTL Markets Broadly to Find the Best Fit for the Technology



Recombinant DNA: Many Companies of All Sizes

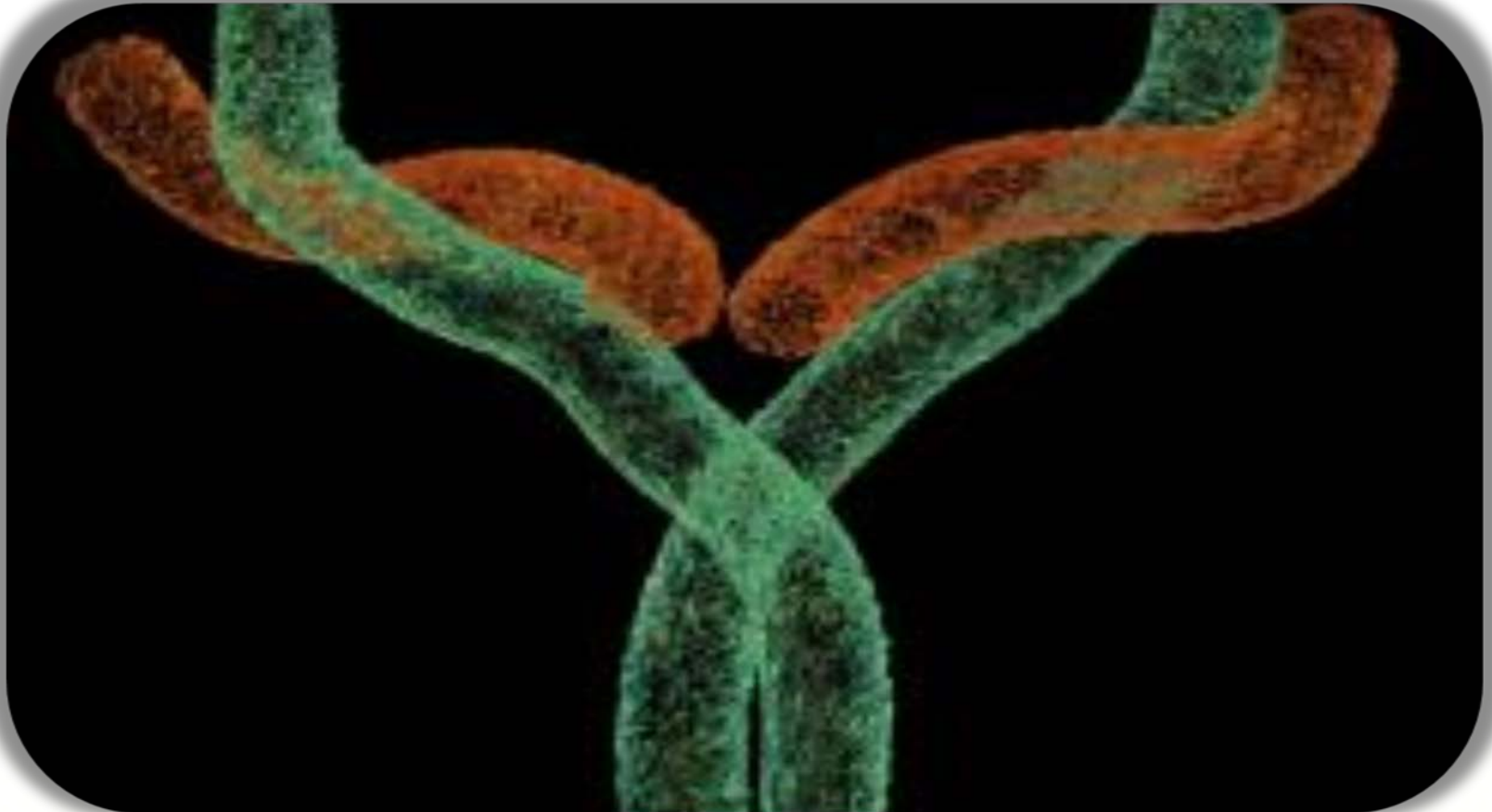
ISOLATION OF GENES FROM COMPLEX CHROMOSOMES BY DNA CLONING



FM Sound: One Big Company



Functional Antibodies: One Mid-Sized Company



Google: One Start-Up Company



157 New License Agreements in FY17

80 non-exclusive

36 exclusive

41 option agreements



Licenses

Then. . .

3 in 1970

Now. . .

157 in FY17

over 2100 active licenses from ~3600 active inventions

>3800 cumulative licenses

some inventions have many licensees

What is in a License?*

Financial terms can include:

- License issue fee
- Annual minimum payments
- Earned royalties
- Equity (if appropriate)
- Reimbursement of patent costs

Non-financial terms can include:

- Field of Use
- Non-exclusive or exclusive rights
- Development milestones and diligence provisions

*Sample Agreement:

http://otl.stanford.edu/industry/resources/industry_res.html?headerbar=2

Equity Can be One Component of the Financial Package



Historically, about **10-15%** of OTL's licenses include equity.
In recent years, this has climbed to **20-25%**.

License Agreements with Equity

19 licenses with equity in FY17

Stanford holds equity in 159 companies as a result of license agreements (as of Aug. 31, 2017)

Managed by Stanford Management Company

Liquidated soon after IPO or at merger/acquisition

Equity Cash-Out at Stanford

\$2.5M in FY17

\$402M cumulative from equity
vs. \$1.91B in total income

\$67M cumulative from non-Google equity
vs. \$1.5B in cumulative cash royalties

Licensed Inventions Can Develop into Products

that generate income
for the company



and royalty returns to
Stanford.



Income

Then...

\$50K in 1970

Now...

\$45.4M in FY17

\$1.91B cumulative

Big Winners...

Cohen-Boyer Recombinant DNA (\$255M)

Google (\$343M)

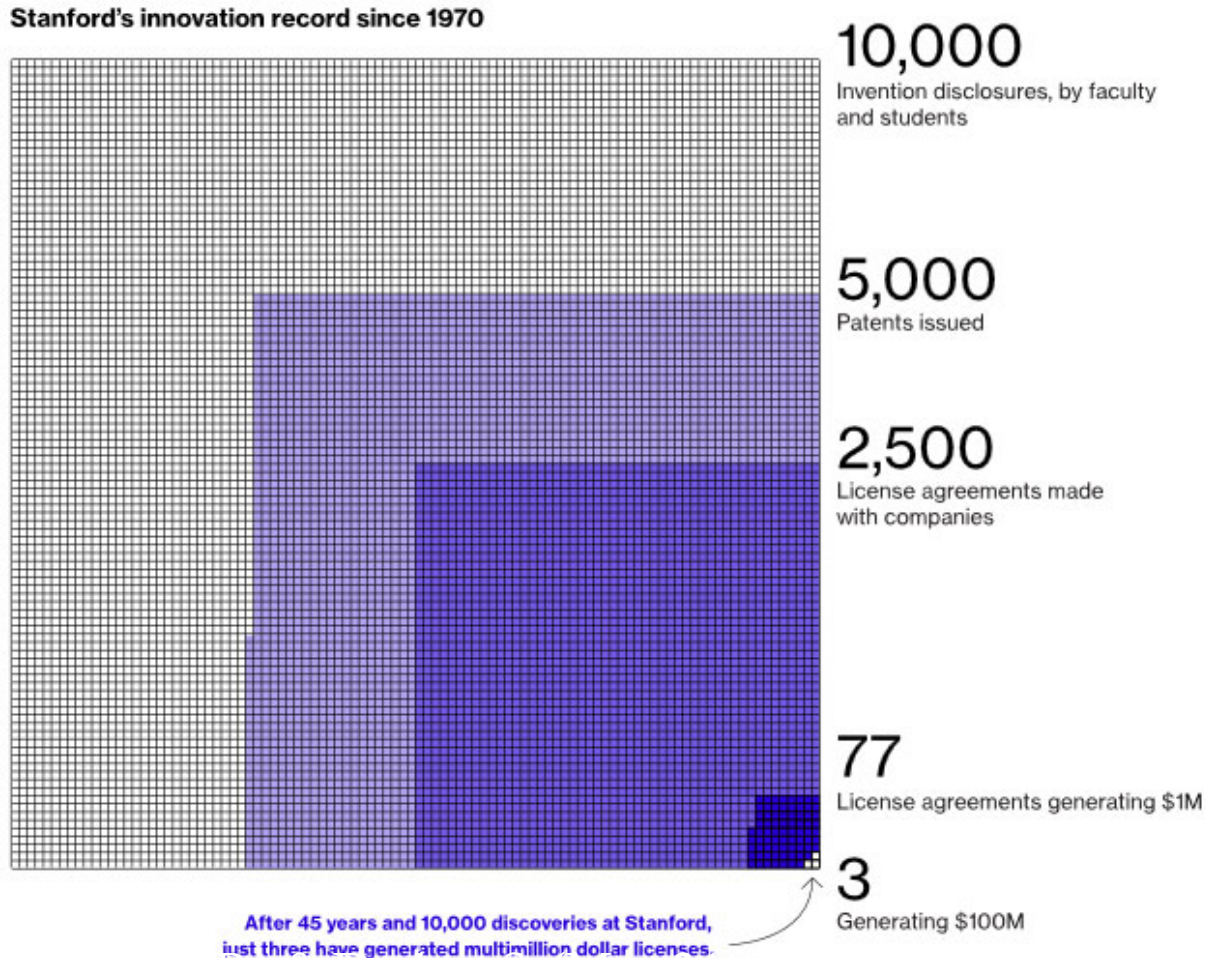
Functional Antibodies (\$628M)

ECONOMY VALUES
PLAN RESULTS SKILLS
QUALITY LEADERSHIP
IDEAS SUCCESS GOALS MONEY
SOLUTIONS TRAINING
FUTURE BUSINESS FINANCE
PARTNERSHIP STRATEGY RISK
GROWTH MANAGEMENT MARKET
INNOVATION EXCELLENCE PRODUCTIVITY
TEAMWORK VISION

Since 1970, Stanford inventions have generated
~\$1.91 Billion in licensing income, **BUT**

only 3 out of ~12,000 inventions was a big
winner and **only 98** have generated over \$1
million.

Most Income Comes from a Few Dockets



University Patent Fights. *Bloomberg*. Retrieved from <http://www.bloomberg.com/graphics/2016-university-patents/>

Most Income Comes from a Few Dockets

808 inventions generated income in FY17

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graph TD; A[808 inventions generated income in FY17] --> B[56 of those generated over $100K]; B --> C[5 of those generated over $1M]; C --> D[1 invention generated over $10M];
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56 of those generated over \$100K

5 of those generated over \$1M

1 invention generated over
\$10M

Licensing Takes Time



OTL Shares the Royalties

After deductions for overhead (15%) and expenses, the net cash royalties are divided:

1/3 to inventors

1/3 to inventors' departments

1/3 to inventors' school



Royalty Sharing for Equity*

In license agreements with equity, OTL typically negotiates 5% or less of the company, depending on the other financial terms.

That equity is then distributed:

15% earmarked for OTL, with the rest divided

1/3 to the inventors
(issued directly to them)

2/3 to Stanford
(designated for the OTL Research Fund and the
VPGE/OTL Graduate Education Fund)

*In order to mitigate potential institutional conflicts of interest, equity is distributed differently than cash and Stanford Management Company handles equity designated for the university (including OTL's share).

OTL Supports Operations, Patent Costs and Research



OTL's **\$8.09 million/year operating budget** is partially-funded through the 15% overhead deduction from royalties.

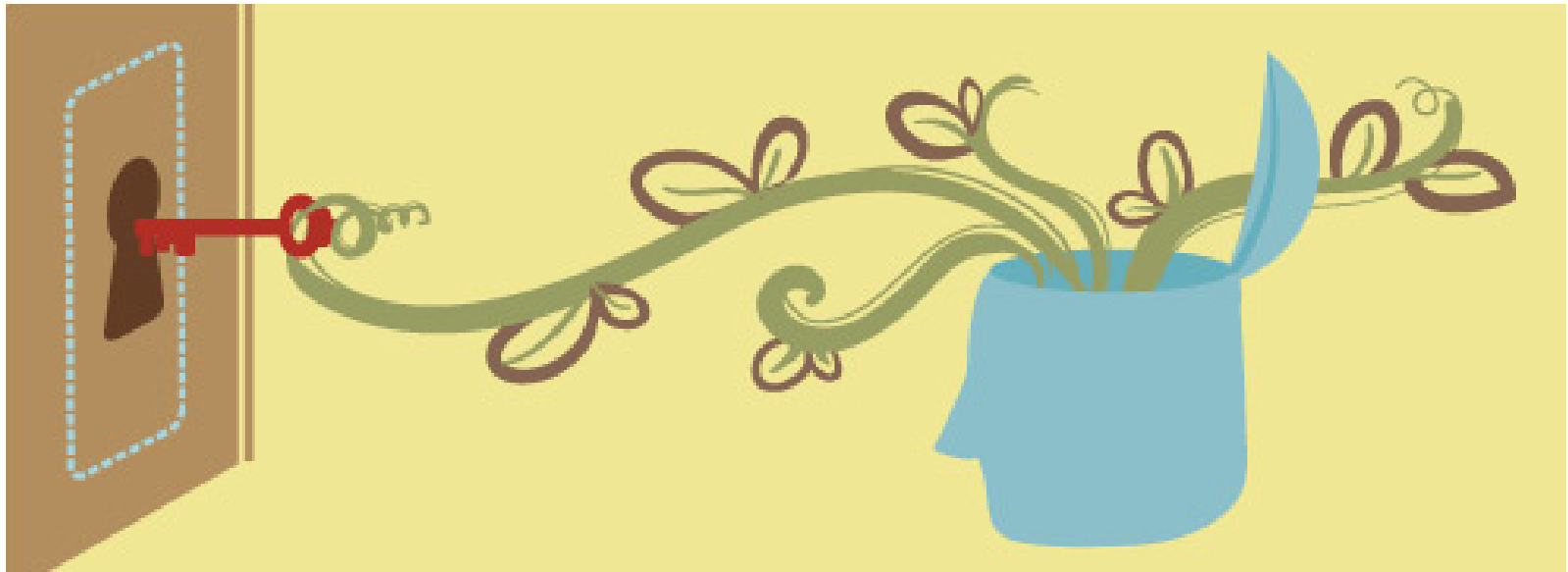
In FY17 **patent expenses were \$10.65 million**, this was partly offset by licensing income.

OTL has **contributed \$88.9 million** collectively to the OTL Research Incentive Fund, the OTL Research Fund, and the Vice Provost of Graduate Education/OTL Graduate Fellowship Fund.

Shared Royalties Support the Next Generation of Innovation



OTL Helps Find a Home for Stanford Inventions...



to grow, develop and provide opportunities for the future.

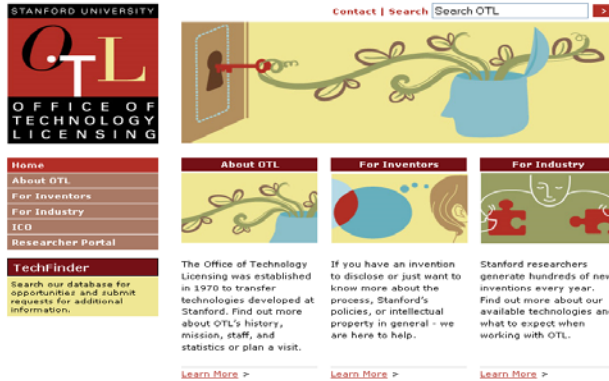
Background: OTL and the Bayh-Dole Act

~81% of research at Stanford is funded by the U.S. government

Bayh-Dole Act: Federal law that created uniform patent policy regarding inventions made under federally-funded research program.

(Council on Governmental Relations publications on intellectual property)

More Information on OTL Website



<http://otl.stanford.edu/>

“The inventions that we are seeing today could change the future”

OTL Annual Report 2015.

Search for new technologies on [Techfinder](#)

TechFinder

Search our database for opportunities and submit requests for additional information.