

ITHI Working Paper Series

#8 Entrepreneurial University Potential Indicators: Case of Stanford University

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The First Level	The second Level	The Third level	Value
{ } Overall (10%)	1. Students in school (15%)	[1] Undergraduate students no. (30%)	7,032
		[2] Postgraduate students no. (40%)	9,304
		[3] Adults School students (20%)	
		[4] Admission in 2017: Freshmen enrolled from high schools/pool (10%)	2,050/44073
	2. Faculty no. (15%)	[1] Total No. (20%)	2,180
		[2] in Science and engineering among them (30%)	
		[3] in social sciences and humanities among them (50%)	
	3. Staff (5%)	[1] Total No. (20%)	12,148
		[2] Managerial and professional (40%)	7,928
		[3] Clerical (10%)	1,780
		[4] Service and maintenance (10%)	1,010

		[5] Employees at the National Laboratory (20%)	1,430 ALAC National Accelerator Laboratory
4. Finances (20%)		[1] Endowment amount (50%)	22.4 billion (as of Aug.31, 2016)
		[2] Endowment No. (25%)	more than 8,000
		[3] 2016-17 enterprise (25%)	\$5.9 billion * * This figure represents the university's consolidated budget for operations, a compilation of all annual operating and restricted budgets that support teaching, scholarship and research, including the budgets of all schools and administrative areas and the SLAC National Accelerator Laboratory. It does not include the \$774 million capital budget and excludes the budgets for Stanford Health Care and the Lucile Packard Children's Hospital.
5. Computing (10%)		[1] Active devices with Internet protocol addresses (40%)	258,400
		[2] Email accounts No. (15%)	49,600
		[3] Incoming mail messages daily (20%)	about 1.6 million
		[4] Public computers (25%)	over 1000 Public computers had more than 366,000 logins and were in use about 250,000 hours by 14,000 unique users during 2015–16. Stanford has been a leader in computer use, research and instruction and the evolution of MOOCs, or “massive open online courses,” as well as flipped classes and technology-rich learning spaces. More than 6 million people have enrolled in Stanford’s free online courses since they were first offered in 2011.
6. Libraries (5%)		[1] No. (20%)	22
	[2] Volumes No. (30%)		(1) Physical : 9.5 million (40%)
			(2) Digital: 1 million (60%)
	[3] Volumes No. in Business (20%)		
[4] Volumes No. in Engineering (20%)			

		[5] Others unique Q2 (10%)	The new David Rumsey Map Center is located on the fourth floor of Green Library. The first-of-its-kind map center is fully integrated with technology and Geographic Information System (GIS) software, offering state-of-the-art research facilities and methods.
7. University Press (5%)	[1] Stanford University Press Year founded (20%)		in 1925
	[2] Books a year published (40%)		approximately 130
	[3] Books currently in print (40%)		more than 3,000, SUP is a publisher of ideas that matter, books that endure.
8. Some notable Stanford alumni (15%) (Q2)	<p>Academic leaders William Brody, Salk Institute president; Nancy Cantor, Rutgers-Newark chancellor; Michael Drake, The Ohio State University president; Pamela Eibeck, University of the Pacific president; Vartan Gregorian, Carnegie Corporation president; Father William Leahy, Boston College president; L. Rafael Reif, MIT president; and Peter Salovey, Yale University president.</p> <p>Arts and entertainment Actors Andre Braugher, Sterling K. Brown, Jennifer Connelly, Issa Rae, Fred Savage and Sigourney Weaver; artists Richard Diebenkorn* and Robert Motherwell*; broadcasters Gretchen Carlson, Dave Fleming, Ted Koppel, Rachel Maddow and Jessica Mendoza; composer David Lang; directors David Chase, Alexander Payne and Jay Roach; pianist Jon Nakamatsu; producers David Brown*, Gale Anne Hurd, Edward Pressman and Richard Zanuck.*</p> <p>Athletics Baseball players Mike Mussina and Jack McDowell; football players John Elway, Toby Gerhart, Andrew Luck, John Lynch, Jim Plunkett and Richard Sherman; basketball players Brook Lopez, Robin Lopez, Nneka Ogumike and Chiney Ogumike; golfers Tom Watson, Michelle Wie and Tiger Woods; Olympians Jennifer Azzi, Janet Evans, Julie Foudy, Eric Heiden, Bob Mathias*, Pablo Morales, Summer Sanders, Kerri Strug, Jenny Thompson and Kerri Walsh; tennis players Bob Bryan, Mike Bryan and John McEnroe; and soccer players Christen Press and Adam Jahn.</p> <p>Business Eric Baker and Jeff Fluhr (StubHub), Mary Barra (General Motors), Steve Ballmer (Los Angeles Clippers), Jeffrey Bewkes (Time Warner), Sergey Brin and Larry Page (Google), Doris Fisher (Gap), Reed Hastings (Netflix), William Hewlett* and David Packard* (Hewlett-Packard), Konstantin Guericke and Reid Hoffman (LinkedIn), Phil Knight (Nike), Marissa Mayer (Yahoo), Scott McGregor (Broadcom); Scott McNealy, Vinod Khosla and Andy Bechtolsheim (Sun Microsystems), Azim Premji (Wipro), Charles R. Schwab, (Charles Schwab Corp.), Debbie Sterling (Goldi-Blox), Kevin Systrom and Mike Krieger (Instagram), Peter Thiel (PayPal) and Jerry Yang and David Filo (Yahoo).</p> <p>Creative writing Novelists Michael Cunningham, Jeffrey Eugenides, Allegra Goodman, Yaa Gyasi, Alice Hoffman, Ken Kesey*, Nicole Krauss, N. Scott Momaday, \ Vikram Seth, John Steinbeck*, Scott Turow and Tobias Wolff; playwrights David Henry Hwang and Mark Medoff; poets laureate Robert Hass and Robert Pinsky.</p>		

		<p>Government U.S. president Herbert Hoover*; Supreme Court justices Stephen Breyer, Anthony Kennedy, Sandra Day O'Connor and William Rehnquist*; U.S. senators Cory Booker, Dianne Feinstein, Jeff Merkley and Ron Wyden; Susan Rice, U.S. National Security Adviser; Julian Castro, U.S. Secretary of Housing and Urban Development; Penny Pritzker, U.S. Secretary of Commerce; ambassador to South Korea Mark Lippert; and ambassador to China Max Baucus.</p> <p>Science and engineering Inventors Vinton Cerf (Internet protocol), John Chowning (synthesizer), Ray Dolby* (noise-reduction system), Ted Hoff (microprocessor), Ted Maiman* (laser), Brad Parkinson (GPS), Brent Townshend (56K modem) and Sally Ride* (first U.S. woman in space); Nobel Prize winners Dudley Herschbach, Roger Kornberg and K. Barry Sharpless (chemistry); and Eric Cornell, Richard E. Taylor and Carl Wieman (physics); Al Roth and Oliver E. Williamson (economics).</p> <p>And more Stewart Brand (internet pioneer), Paul Draper (vintner), Matt Flannery (Kiva), Atul Gawande (surgeon and author), Jessica Jackley (Kiva), Robert Mondavi,* (vintner), Jeff Raikes (Raikes Foundation), Blake Ross (Mozilla firefox developer), Jeffrey Skoll (Skoll foundation), Edward Tufte (statistician).</p>		
	9. Administration entrepreneurial idea (10%)	Q2 self-assessment and assessed		
{II} Teaching (15%)	1. Student : faculty (15%)	4:1		
	2. Undergraduate department and programs no. (20%)	(7032 students)		
	3. Graduate department and programs no. (25%)	more than 90 (9304 students)		
	4. Total Degrees No. (10%)	18	Stanford offers the following degrees: BA, BS, BAS, MA, MS, PhD, DMA, MD, MBA, JD, JSD, JSM, LLM, MFA, MLS, MLA, MPP, ENG	
	5. Graduate School of Business (10%)	[1] Year established (10%)	in 1925	
		[2] Students No. (20%)	Among the Graduate Students,	11%, fall 2016

		[3] Programs (30%)	two-year MBA program with 834 students; one-year MSx for Experienced Leaders program with 91 students; PhD program with 132 students in residence; six-week residential Stanford Executive Program for senior executives; some 60 Executive Education courses; Stanford Ignite, a partite program in innovation and entrepreneurship; joint MBA degrees with law, electrical engineering, computer science, environment and resources, public policy and education.
		[4] Alumni worldwide (20%) Q2	about 33,000 GSB
		[5] Faculty members (20%)	125, include three Nobel laureates
	6. School of Engineering (20%)	[1] Year established (5%)	in 1926
		[2] Students No. (10%)	3,370; 38% among the Graduate Students, Fall 2016
		[3] Departments No. (10%)	9
		[4] Enrolled Students No. (10%)	More than 5,000 graduate and undergraduate students
		[5] Faculty members (10%)	More than 250
		[6] Programs (20%)	
		[7] Laboratories No. (20%)	
[8] Centers and institutes (15%)			
{III} Research (30%)	1. Undergraduates: graduates (5%)	7032 : 9304= 3 : 4	
	2. Research programs (20%)	[1] Grant programs No. (20%)	1,041 projects, in 2015–16, * Stanford believes learning is enhanced by participation in research.

	[2] Grant programs Amount (20%)	In 2015–16, about \$5.5 million
	[3] Externally sponsored projects No. (40%)	Over 6,009 in 2016-2017
	[4] Total budget (20%)	\$1.6 billion ** Including the SLAC National Accelerator Laboratory (SLAC). Of these projects, the federal government sponsors approximately 81 percent, including SLAC. In addition, nearly \$277 million in support comes from non-federal funding sources.
3. Sources of fundings (10%)	[1] Endowment Income (15%)	20%
	[2] Social Service (15%)	20% * Stanford Healthcare service
	[3] Sponsored research (25%)	18%
	[4] Student income (15%)	15%
	[5] National Laboratory (10%)	10% * SLAC National Accelerator Laboratory
	[6] Other income (5%)	9%
	[7] Expendable gifts and Net Assets released (5%)	6%
	[8] Other investment income (10%)	2%
4. Federal government sponsors (10%)	[1] Federal funding sources (40%)	1.296 Billion (81%)
	[2] Nonfederal funding sources (60%)	Nearly \$277 million
5. Inventions Patents (20%)	[1] No. Applied (30%)	
	[2] No. granted (70%)	
6. Rewards (15%)	[1] Total No. (30%)	
	[2] Quality analysis (Q2) (70%)	

	7. National research programs with centers at Stanford (10%)	2	Departments of Plant Biology and Global Ecology of the Carnegie Institution for Science National Bureau of Economic Research
	8. National Accelerator Laboratory (5%)	1 (Q2-quality evaluation)	SLAC *National Accelerator Laboratory is a U.S. Department of Energy national laboratory operated by Stanford. Research at SLAC addresses questions in chemistry, materials and energy sciences, bioscience, fusion energy science, high-energy physics, cosmology, advanced accelerator development and other fields. More than 2,700 scientists worldwide use the lab's facilities each year, and more than 700 scientific papers are published annually based on research at SLAC—research that has earned four Nobel prizes.
	9. Independent Laboratories, Centers and Institutes (5%)	18	Physical Sciences <ul style="list-style-type: none"> ▪ Geballe Laboratory for Advanced Materials (GLAM), conducting research jointly with SLAC ▪ E. L. Ginzton Laboratory ▪ W. W. Hansen Experimental Physics Laboratory (HEPL) ▪ Kavli Institute for Particle Astrophysics and Cosmology (KIPAC), operated jointly with SLAC ▪ PULSE Institute for Ultrafast Energy Science, operated jointly with SLAC ▪ Stanford Institute for Materials and Energy Sciences (SIMES), operated jointly with SLAC Environmental Sciences <ul style="list-style-type: none"> ▪ Precourt Institute for Energy ▪ Stanford Woods Institute for the Environment Humanities and Social Sciences <ul style="list-style-type: none"> ▪ Freeman Spogli Institute for International Studies at Stanford (FSI) ▪ Center for the Study of Language and Information (CSLI) ▪ Stanford Center on Longevity (SCL) ▪ Stanford Humanities Center (SHC) ▪ Stanford Institute for Economic Policy Research (SIEPR) ▪ Center for Advanced Study in the Behavioral Sciences (CASBS) Biological and Life Sciences <ul style="list-style-type: none"> ▪ Spectrum, the Stanford Center for Clinical and Translational Research and Education ▪ Stanford Bio-X, the interdisciplinary program related to bioengineering, biosciences and biomedicine ▪ Stanford Chemistry, Engineering & Medicine for Human Health (ChEM-H) ▪ Stanford Neurosciences Institute
	1. Technology transfer (TTO) (30%)	[1] Technologies No. * Stanford's Office of Technology Licensing (OTL)—brings technology created at Stanford to market (30%)	779 in 2015-16

{IV} Entrepreneurship (45%)		[2] Gross royalty revenue (30%)	\$ 94.22 million
		[3] New licenses concluded by OTL (20%)	141 in 2015-16
		[4] Successful license cases (Q2) (20%)	Among the Inventions Licensed by OTL:

			<p>Antibody therapies: In the 1980s, Leonard Herzenberg, Vernon Oi and Sherie Morrison invented a technique for producing functional antibodies, enabling treatments for such conditions as autoimmune diseases and cancer.</p> <p>Bioplastics: Researchers in Craig Criddle's laboratory have developed a method of producing bioplastics from municipal, agricultural and food waste materials.</p> <p>Data analytics: Visualization software created in 2001 in the laboratory of Patrick Hanrahan helps anyone working with large amounts of data to quickly analyze, visualize and share information.</p> <p>Digital music: John Chowning developed FM sound synthesis for digitally generating sounds in the late 1960s, leading to the music synthesizer.</p> <p>Disease management: The Stanford Patient Education Research Center creates programs for chronic health problems, including arthritis and HIV/AIDS, that have been licensed to more than 500 organizations in 17 countries.</p> <p>DSL: In the 1980s, John Cioffi and his students discovered how to use traditional phone lines for high-speed data transmission, resulting in patents used in asymmetric digital subscriber lines.</p> <p>Google: The world's most popular search engine got its start at Stanford in 1996 when Sergey Brin and Larry Page developed the page-rank algorithm while computer science graduate students.</p> <p>Optical fiber amplifier: This invention by John Shaw and Michel J.F. Dignonnet enabled the bandwidth explosion in optical communications and telecommunications essential to the Internet.</p> <p>Recombinant DNA: This ubiquitous tool for molecular biology was developed in 1973 by Stanley Cohen and Herbert Boyer to enable scientists to perform genetic engineering by combining pieces of DNA from different organisms, laying the groundwork for the biotechnology industry.</p> <p>Refocus photography: Ren Ng, Patrick Hanrahan, Marc Levoy and Mark Horowitz invented a camera that captures an entire light field with an array of thousands of sensors. Photographers can use this camera to take interactive pictures that can be refocused after the fact.</p> <p>Tuberculosis test: Gary Schoolnik and colleagues developed a diagnostic test for tuberculosis that can distinguish between patients who have been vaccinated and those who actually have the disease.</p>
	<p>2. University Spin-offs (40%)</p>	<p>[1] Annual revenue from the Companies formed by Stanford entrepreneurs (30%)</p>	<p>A 2012 study estimated, \$2.7 trillion annually since the 1930s.</p>

		[2] Created jobs (20%)	5.4 million jobs since the 1930s.
		[3] No. of the companies created by Stanford alumni and faculty (30%)	39,900 companies since the 1930s, which, if gathered collectively into an independent nation, would constitute the world's 10th largest economy.

(4) Impact of Some Successful companies that Stanford faculty and alumni have helped create (Q2) (20%)

- Atheros Communications
- Charles Schwab & Company
- Cisco Systems
- Cypress Semiconductor
- Dolby Laboratories
- eBay
- E*Trade
- Electronic Arts
- Exponent
- Gap
- Goodreads
- Google
- Hewlett-Packard Company
- IDEO
- Instagram
- Intuit
- Intuitive Surgical
- Kiva
- LinkedIn
- Logitech
- MIPS Technologies
- Netflix
- Nike
- NVIDIA
- Odwalla
- One Kings Lane
- Orbitz
- Rambus
- Silicon Graphics
- Stub Hub
- Sun Microsystems
- SunPower Corp.
- Taiwan Semiconductor
- Tesla Motors
- Trader Joe's
- Varian
- VMware
- Whole Earth Catalog
- Yahoo!
- Zillow

3. Science parks and Incubators (30%)	Year established (5%)	1951
	Covered area	700 acres
	Tenants number (20%)	140 * https://en.wikipedia.org/wiki/Stanford_Research_Park
	Annual revenue of the tenant firms (30%)	
	Annual revenue of the Parks (20%)	
	Created Jobs (15%)	23,000 employees
	Incubators / accelerators Q2 (10%)	StartX
	Successful firms cases Q2 (10%)	HP, Varian, Skype, ...

Data Sources: Stanford Fact 2016, Stanford Fact 2017