

University-industry collaboration: A closer look for research leaders

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What is university-industry collaboration?

“Our university is committed to excellent teaching, innovative research, and the personal and intellectual growth of its students in a diverse academic community.”

Above is a mission statement from a prominent US research university. It is typical of most. The notable features of the mission statement are the commitment to the students and the academic community.

The primary purpose of corporations is to deliver shareholder value. For start-ups, they must provide returns to their investors.

The academic culture encourages openness; researchers are motivated to share and publish new findings. In contrast, corporate culture is more guarded; they need to monetize their innovations.

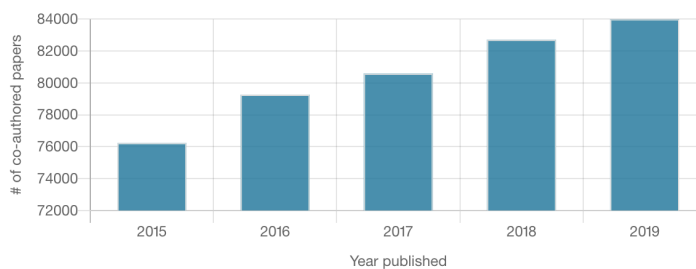
With these divergent agendas, can they ever get along? Let alone collaborate?

The answer is a resounding yes. Cultures are rapidly changing for both universities and companies, and corporate culture is embracing openness more and more. And, universities are realizing they need a way to make their findings more socially relevant.

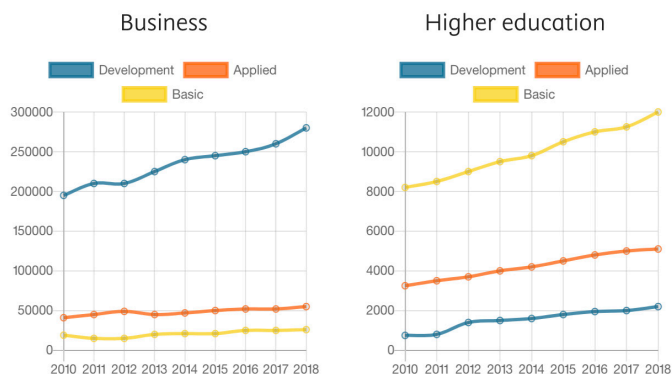
Universities and industry collaborations are on the rise. According to a news blog item from Nature Index, academic-industry collaborations more than doubled between 2012 and 2016. The chart below shows that, according to Scopus, the global number of papers co-authored by a research institution and an industry partner is on a steady rise.

Source: NSF, National Patterns of R&D Resources: 2017-2018 Data Update. Expenditure in millions constant 2012\$

Academic-Corporate co-authored publication growth 2015-2019

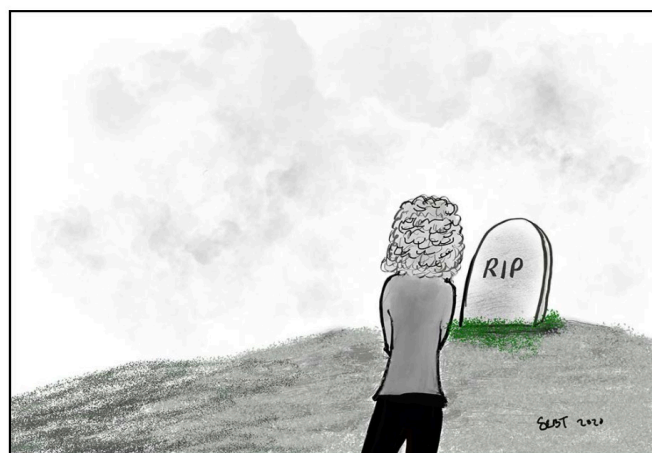


The chart below shows that while universities and their industry partners have different missions, they also have complementary skillsets. Each brings something to the table for innovative discoveries. University researchers are good at finding difficult problems and having the freedom to pursue different solutions; companies are good at taking discoveries and developing them.



As you can see from the chart above, the two sectors' investments are different but complementary. Having these complementary skills is a reliable formula for successful partnerships.

University and industry collaboration comes in many forms.



Two scientists walk into a bar. One says, "I'll have the H₂O, please." He gets some water. The other says, "I'll have some H₂O too." He dies.

This scene is often the beginning of fruitful collaborations (minus the death).

Imagine two researchers – one from a biotech start-up and another from a large university medical research lab – meet at a conference. They discover they have similar research interests and share research and jointly publishing papers. Serendipity can be a powerful force in driving innovations. This collaboration might start with a simple interaction, but is also one that leads to fruitful discoveries.

Now, examine the idea of a much broader engagement between a university and an industry partner. This collaboration is often a strategic partnership with the most senior levels in university leadership taking part. An example of this is the relationship between the University of Cincinnati and Procter & Gamble.

Dr. Philip Taylor, former Assistant Vice President, Office of Research at the University of Cincinnati and current President of Philip H Taylor, Environmental Consulting, shares his unique perspective from both the industry and university sectors. He sees the advantage of these agreements as bringing big problems to the university, which has the infrastructure, the architecture, and the right person to work on it. And, for the university, the agreement brings substantial industry funding.

There are examples of these collaborations around the globe.

According to **Dr. Luigi Occhipinti**, Director of Research at the University of Cambridge, he often sees collaborations in the engineering department and start small and grow. He cites Dyson as an excellent example. In 2016, Cambridge and Dyson jointly opened the **Dyson Centre for Engineering Design**.

At the 2020 Times Higher Education World Academic Summit during the panel, "Will universities reimagine collaboration with global companies after COVID-19?" Dr. Vidya Yeravdekar, Pro-Chancellor, Symbiosis International University, India, related that the Serum Institute of India is working with **AstraZeneca and Oxford University** on manufacturing the potential COVID-19 vaccine. She stated,

"Hopefully we will see this very wonderful industry, academia collaboration happening between a global university, like Oxford University, and a company in India."

The role government plays in university-industry collaboration.

Often governments play a role in these types of collaboration. Their involvement has generally been increasing and varies significantly by country. Three-way partnerships between Industry-Government-University are sometimes called **Triple Helix**.

In "**Why two heads are better than one: the power of university-industry collaborations**," a recent episode of the Research 2030 podcast, **Dr. Tony Boccanfuso**, President of UIDP (University-Industry Demonstration Partnership), notes that, in the United States, the government's role has been relatively hands-off, but that trend is changing globally.

[Listen](#) in his own words.



According to Dr. Occhipinti, one example of public funding agency is the Engineering and Physical Sciences Research Council (EPSRC) in the UK, supporting the Centres for Doctoral Training programs for university students, often also supported by industry partners.

A Chinese director of medical research told us about a broad, multi-year agreement between a pharmaceutical company, a university and the Chinese Academy of Sciences as an example of a triple helix arrangement.

An intriguing example of a successful government program to encourage these collaborations in the US is the [National Cancer Institute \(NCI\) Alliance for Nanotechnology in Cancer](#). According to their [website](#),

The Alliance model for translational research is that discoveries made in academic laboratories are handed off to for-profit partners for efficient development into research and clinical products. Alliance members have been eager to bring their technology to the clinic, forming over 100 start-up companies and partnerships with existing biotechnology firms. Many of these start-ups are thriving and now offer products, research, or consulting services to the academic and clinical communities. Others have attracted significant investment from large pharmaceutical companies and venture capital funds.”

Why would universities and industries collaborate?

The executive summary of the United Kingdom’s review of university-industry collaboration, “[The Dowling Review of Business-University Research Collaborations](#)” states:

Strategic business-university research collaborations provide a myriad of benefits to their participants. For academics, these benefits can include the opportunity to address challenging research questions with real-world applications, see their research have tangible impacts and gain access to new skills, data or equipment. Companies can improve business performance through developing new techniques or technologies, de-risk investment in research, and extend the capabilities and expertise available to the firm.”

According to the “[Researcher Guidebook: A Guide for Successful Institutional-Industrial Collaborations](#)” published by UIDP,

“Both institutions and industries have much to gain from these collaborations since they promote the discovery of new synergies and models that promise mutual potential for ROI. For companies, partnering with institutions provides access to expertise and research that spurs innovation, extends their resources, and sharpens their competitive advantage. For non-profit institutions facing tightening federal budgets—which have created funding gaps in even the top laboratories, collaborations with industry offer promising revenue streams, effective ways to keep abreast of changing market and industry dynamics, and increased competitiveness in pursuing federal funding opportunities.”

We asked global research leaders why they value collaborating with industry. Their top five answers:

- Better potential for societal impact
- Better student opportunities and outcomes
- Increased funding
- Economic development potential
- Utilize government programs for funding

Societal Impact

Globally, governments and citizens look to universities to demonstrate a beneficial impact on economies and society. Universities are eager to fulfill this goal.



As we learned earlier, universities are good at fundamental discoveries, and industry is good at translating those discoveries. One way for universities to provide societal impact is to partner with a corporation or other business to develop a discovery into something that society can use.

According to Boccanfuso,

“The private sector recognizes these opportunities to partner with the universities, to leverage their efforts where you get this co-creation model, where everybody brings something that they can bring to the table.”

At the 2020 Times Higher Education World Academic Summit during the panel, “Will universities reimagine collaboration with global companies after COVID-19?” Warwick Dawson, Director Knowledge Exchange, University of New South Wales, Australia, said,

“The specific role and purpose of the knowledge exchange team is to enable, facilitate, and accelerate the conversion of knowledge to impact society through strong engagement, partnership, and collaboration with external organizations. We can only achieve the conversion of knowledge to impact through collaboration and partnership, typically with government, industry and the community.”

Student outcomes

One of the primary purposes of higher education is preparing students for career success. When a university works with an industry partner, they can offer opportunities beyond the classroom or research lab. These opportunities can take many forms, from guest lectures, industrial supervision, internships to research partnerships. According to Dr. Taylor, one of their corporate partnerships helped create a pipeline for their graduates to find a career.



According to Dr. Yeravdekar, at Symbiosis International University in Pune, India, they allow their PhD scholars to spend 3-4 months (or more) working with an industry partner. This program helps expose their students to a career in industry and a potential future job opportunity.

The UIDP Researcher Guidebook lists many opportunities for industry collaboration, including:

“Working with a company can provide valuable experience to students, particularly graduate students. The opportunity to participate at some level in a company-sponsored project allows students to assess potential industries and companies and build relationships that can lead to career development.”

Increase funding

Most government funding is not increasing. Researchers and research institutions are looking for alternative funds, and corporations can provide a good alternative. Funding can come in many forms — there are almost as many examples of funding from industry partners as partnerships. They can range widely in size. According to Dr. Taylor,

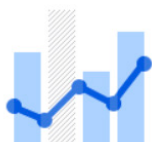


“Researchers are interested in a direct relationship with somebody in industry on a problem with mutual interest. They might have monthly meetings, and you develop the relationship. A project might go on a year, and the researcher might get a \$100,000. It’s a nice program, and you’re going to publish the work with your colleague in industry.”

Dr. Taylor further indicated that this is an excellent way to start building rapport and a relationship.

Economic development

In Urban Studies scholar Karl Seidman’s book, “Economic Development Finance” he defines economic development as,



“A process of creating and utilizing physical, human, financial, and social assets to generate improved and broadly shared economic well-being and quality of life for a community or region.”

If local companies work with local universities within a given region, that encourages the region’s economic development.

There are various initiatives to encourage universities to consider themselves part of a community and engage with that community. One example is the Association of Public Land-Grant Universities (APLU) in the US. According to their [website](#),

“Public research universities are engaged in their communities and regions, tackling societal challenges, creating great places to work and live, and advancing economic growth and prosperity. Universities partner with community organizations, state and local government, entrepreneurs, small businesses, major corporations, and economic development organizations.”

Some universities highlight their researchers and research facilities so local businesses can partner with them for

research. One way to accomplish this is through a research portal, such as [Pure](#), that showcases what the university offers.

Government

According to UIDP’s “Researcher Handbook, A guide for Successful Institutional-Industrial Collaborations,” government mandates encourage universities to seek industry partners. The guide references US funding:



“The federal agencies that fund most research (e.g., National Institutes of Health, National Science Foundation, Department of Energy, Department of Defense, National Aeronautics and Space Administration, Department of Agriculture) encourage proposals that include collaborations with industry. Some federal programs require an industry partner to qualify for funding.”

Dr. Mary Juhas, Associate Vice President, Office of Research, The Ohio State University, Leader of Ohio State ADVANCE, participated in the panel, “Will universities reimagine collaboration with global companies after COVID-19?” at the 2020 Times Higher Education World Academic Summit. She referenced how the industry-university cooperative research program (IUCRC) run by the National Science Foundation (NSF) in the US has effectively catalyzed these kinds of collaborations.

What helps university-industry collaborations succeed?

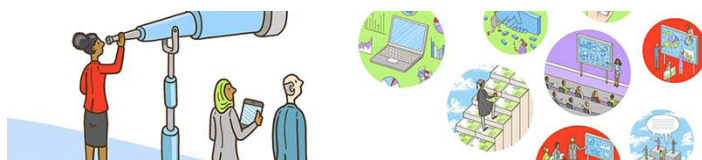
Unfortunately, this is a simple question without an easy answer, although Dr. Lesley Thompson, Vice President at Elsevier and former Programme Director at the Engineering and Physical Sciences Research Council (EPSRC), the largest of the seven UK research councils, sums it up nicely:

“You’re in it for the long term, and you are generous in your relationship.”

At the beginning of this guide, we acknowledged the different missions and agendas of both higher ed institutions and the private sector. Dr. Thompson indicates that the most successful collaborations might start small. But, if both sides see the potential for a long-term partnership and share and communicate broadly, then the likelihood of success is greater.

Another critical aspect of successful collaborations is previous experience with a partner or a shared research agenda.

How can a university find an industry partner?



According to industry leaders, the two most important aspects they look for when starting a new project are a university partner:

- With a shared history of successful collaborations
- Working in the same research areas with a similar research agenda

Significant collaborations with broad agreements, like [AstraZeneca and Oxford University](#), are well known. However, there are often smaller, less visible collaborations between researchers. When a university's Office of Research knows about these collaborations, they can nurture and expand them.

Likewise, suppose you know which companies are researching the same areas as you. In that case, you can try to align some projects and begin a new collaboration strategically.

How to find potential partners that meet one or both of these requirements? The key is data. One piece of data to evaluate and help you solve this puzzle is publication data. You can determine which industry partners you share co-authored papers with. Or, you can assess the papers from potential corporations to see which areas they are publishing in.

Here is a list of companies which a US research university has co-authored papers with.

In this example, the Engineering Department of the university wants to expand its corporate partnerships. This department has done a little bit with Caterpillar, Inc. Currently, they have seven researchers and four co-authored papers. Since this particular university is in the same region as Caterpillar, it is an exciting company to explore in more depth.

Identify Potential Industry Partners with SciVal



[Watch the video](#)

There are other examples of investigating co-authored papers to better understand your current collaborations and to determine potential new partners.

SciVal		Overview	Benchmarking	Collaboration	Trends	Reporting	My SciVal	Scopus ↗	?	3	MP
		2017 to 2020		Engineering							
Institution	Co-authored publications ↓	Co-authors at University X	Co-authors at the other institution	Field-Weighted Citation Impact ↓							
Ford Motor Company	24 ▲	29 ▲	18 ▲	2.06							
Dow Chemical	9 ▼	17 ▼	11	1.70							
Rolls-Royce	8 ▼	4	4 ▼	1.26							
Samsung	8 ▼	15 ▼	7 ▼	1.24							
Boeing	7	5 ▲	2	1.74							
Microsoft USA	5 ▼	8 ▼	6 ▼	3.07							
Mitsubishi Electric Research USA	5 ▲	6 ▲	8 ▲	6.98							
A.O. Smith Corporation	4 ▲	6 ▲	1 ▲	1.80							
Caterpillar Inc.	4 ▲	7 ▲	2 ▲	1.53							
HYPRES, Inc.	4 ▲	3 ▼	5 ▼	1.27							
IBM	4	9 ▼	14 ▲	1.14							

Source: [SciVal](#) – a tool for visualizing research performance.

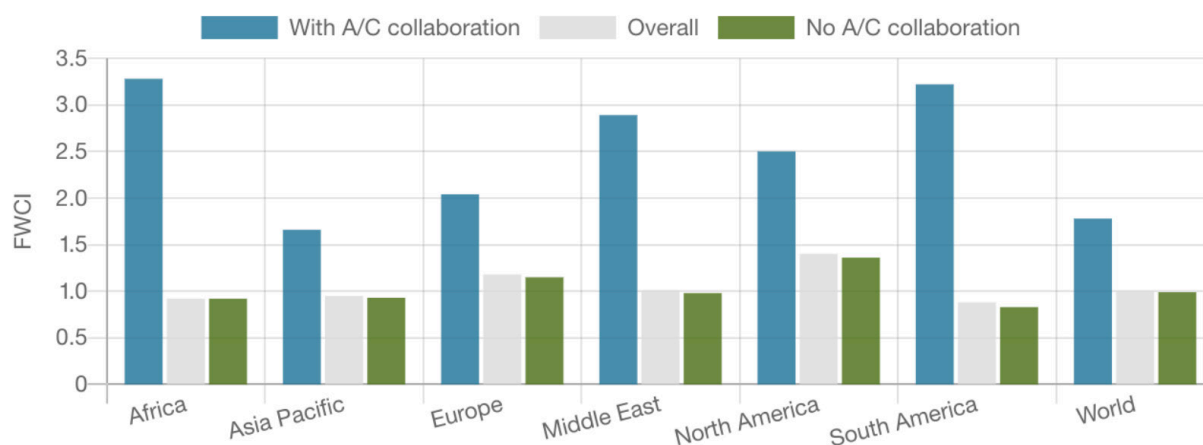
How does collaborating with industry affect citation impact?

Google the question, “What is the most impactful paper of the 21st century,” and the first result is “The most cited articles of the 21st century.” The academic way of measuring impact is by publishing your research and seeing how many other articles cite that research: the more cites, the more impact.

The screenshot shows a Google search interface. The search bar contains the text "What is the most impactful paper of the 21st century?". Below the search bar, there are navigation options: All, News, Images, Videos, Shopping, More, Settings, and Tools. The search results show "About 1,070,000,000 results (0.74 seconds)". The first result is from www.researchgate.net, titled "The most cited articles of the 21st century | Request PDF". Below the title, there is a snippet: "The aim of this paper is to collect the most-cited articles of the 21st century and to study how this group changed over time. Here the term 'most-cited' is ...". Below the search results, there is a "People also ask" section with four questions: "What is the most cited paper ever?", "Who has the highest citation?", "What is the most cited paper on Google Scholar?", and "How many citations are considered good?".

Academic researchers often believe that papers co-authored with a corporate partner are cited less than ones written with academic partners.

To determine whether this is true, we examined different types of co-authored collaborations. We analyzed the citation impact around the globe using a [field-weighted citation impact metric](#).



Source: “Will universities reimagine collaboration with global companies after COVID-19?” panel at the 2020 Times Higher Education World Academic Summit.

As you can see, for every region, the research they published with an industry co-author (blue bar) had a higher citation impact. The urban myth of less respect for collaborating with industry is busted. Researchers should feel empowered to pursue this for all its advantages.