

A New Model for Industry-Academic Partnerships¹

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Abstract

The mission of the academic social sciences is to understand and ameliorate society's greatest challenges. The data held by private companies hold vast potential to further this mission. Yet, because of their interaction with highly politicized issues, customer privacy, proprietary content, and differing goals of business and academia, these datasets are often inaccessible to university researchers. We propose here a model for industry-academic partnerships that addresses these problems via a novel organizational structure: Respected scholars form a commission which, as a trusted third party, receives access to all relevant company information and systems, and then invites independent academics to do research in specific areas, following standard peer review protocols, funded by nonprofit foundations, and with no pre-publication approval by the company required. We also report on a partnership we helped forge under this model to make data available about the extremely visible and highly politicized issues surrounding the impact of social media on elections and democracy. In our partnership, Facebook will provide privacy-preserving data access; seven major ideologically and substantively diverse nonprofit foundations will fund the research; and a nonprofit academic association will oversee the peer review process for funding and data access.

¹ Draft in progress; comments welcome (send to King@Harvard.edu). The current version of this paper is available at GaryKing.org/partnerships.

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1. Introduction

To deliver and improve their popular products, modern internet technology firms collect large quantities of data about human behavior. This data enables companies to make better decisions by building on research and methods from the social sciences and other fields. However, it also holds the potential to advance social scientific discovery, increase social good, and provide the insights to understand and ameliorate important problems afflicting human societies. Successful industry-academic collaboration can thus simultaneously help a company, advance science, and benefit society.

Yet, progress in and from data sharing for social good will only occur if all incentives are aligned -- if individual privacy is protected, company trade secrets and related proprietary information are respected, and the standards and independence of the scientific process are secured. Even though “academics provide the creative fuel for much early-stage research that leads to industrial innovation,” achieving all these goals simultaneously is difficult in any area (Jasny et al., 2017), especially for the novel data types collected by internet technology firms.

We propose here a new model of industry-academic partnerships designed to span the divide between the needs of internet technology firms, academic researchers, and the public, even in highly politicized environments. We begin by describing the problem we address (Section 2) and our proposed two-part organizational solution (Section 3). We then introduce a set of ethical procedures designed to protect all parties involved, including especially the public who are at once customers, research subjects, and beneficiaries of the partnership (Section 4). We then summarize the application of our model to study the impact of social media on elections and democracy with a partnership we forged for academics with Facebook and seven major ideologically diverse charitable foundations (Section 5). We also discuss the incentives the various parties have to participate (Section 6) and conclude (Section 7).

2. The Problem

For most of their history, the academic social sciences collected or purchased their own data and so have had only occasional need for formal data use agreements and other relationships with industry. When they had more of a need, they followed the traditional model for industry-academic partnerships in the natural and physical sciences where private firms donate funds, data, or expertise to a university lab for a specific research project or program, often in return for considerations such as right of first refusal to license any resulting patents and pre-publication review (but not pre-publication approval) (e.g., Corzo and Eastman, 2015). This

model works well where a company funds, and perhaps even details a few employees to work at, a university lab for a specified period of time. The academic researchers then operate independently and have unfettered control over their research agenda, methodological choices, and publication options. This time honored partnership model has generated enormous value for academic researchers, private firms, the scientific community, and society at large.

Unfortunately, the difficulties of collaboration with academia in the era of big data about human behavior means that this traditional industry-academic partnership model does not work in many areas. Not long ago much social science research could be completed without industry, since most data was created by academics or accessible from governments or firms making data public. Today, big data collected by firms about individuals and human societies is more informative than ever before, which means it has increasing scientific value but also more potential to violate individual privacy or help a firm's competitors. Although many types of social science research require a partnership with private firms even to begin a study, many are understandably more leery of sharing data. In other words, social scientists have access to more data than ever before to study human society, but a far smaller proportion of existing data than at any time in history.

The problem we must overcome is that neither of the two logical antipodean approaches work to solve the problem -- especially for high profile, highly politicized, sensitive issues. In the first approach, academic researchers would remain fully independent, without pre-publication approval. Unfortunately, even if a large technology firm were willing to share data with many researchers and the privacy of individuals could be assured, proper inferences require the full chain of evidence from the world to the data, in this case often requiring proprietary information about the firm's policies, practices, procedures, and platforms, and sometimes even access to its computer systems. Published scholarly articles accessing proprietary data in this way without legal agreements requiring nondisclosure and pre-publication approval are rare, although a variety of clever ad hoc compromises and approximations have been used in specific situations (e.g., Chen et al., 2017).

In the second approach, academic researchers sometimes go inside companies and become consultants. They sign nondisclosure and other legal agreements and obtain all necessary data, information, and systems necessary to do novel research, but they have at least somewhat limited ability to publish freely. We can think of these academic consulting arrangements as falling on a continuum: At one end, they can be highly restrictive, with tight control and pre-publication approval -- such as for sensitive issues close to the firm's core products. At the other end, they can have lax, or pro-forma regulation -- usually when firms benefit from openness, allow collaborations between internal and external researchers, retain the right to patent before publication, and allow research on topics orthogonal to core products.

Consultant contributions to the firm can be large and may be of the highest scientific quality, but their contributions to the scientific community become complicated as we move closer to the first end of the continuum. In addition to the well known effects of financial and other conflicts of interest on research conclusions (Banaji and Greenwald, 2013; Wilson and Brekke 1994; Koehler, 1998), some form of pre-publication approval, however lax, almost always exists for all points along the continuum. We thus seek here a better solution, designed especially for internet technology firms, with highly valuable, highly informative, and highly sensitive data.

There are certainly other models of industry-academic relations (Perkman et al., 2013; Ankrah and AL-Tabbaa, 2015). For example, social scientists now often leave the academy to conduct research in industry or work in collaboration with data scientists within firms. These researchers then have far more access to the data and more influence on products that affect millions of people, but they must work on projects that are of the highest priority to the company. As a result, their work is not always aligned with the questions that are of greatest interest to the scholarly community or society at large.

The dilemma is nevertheless stark: Academic independence with inadequate information generates little value. Full information with dependence on the firm for pre-publication approval poses actual or apparent conflicts of interest. And the many ad hoc approaches around these problems are difficult for individual scholars to negotiate, especially on highly charged politicized issues. These issues are sometimes overcome with ad hoc approaches, but only rarely on issues that are politically or commercially sensitive. The challenge with all of the models described here is that they do not scale as well as they might. Data remains only accessible to relatively few, and scientific progress suffers as a result.

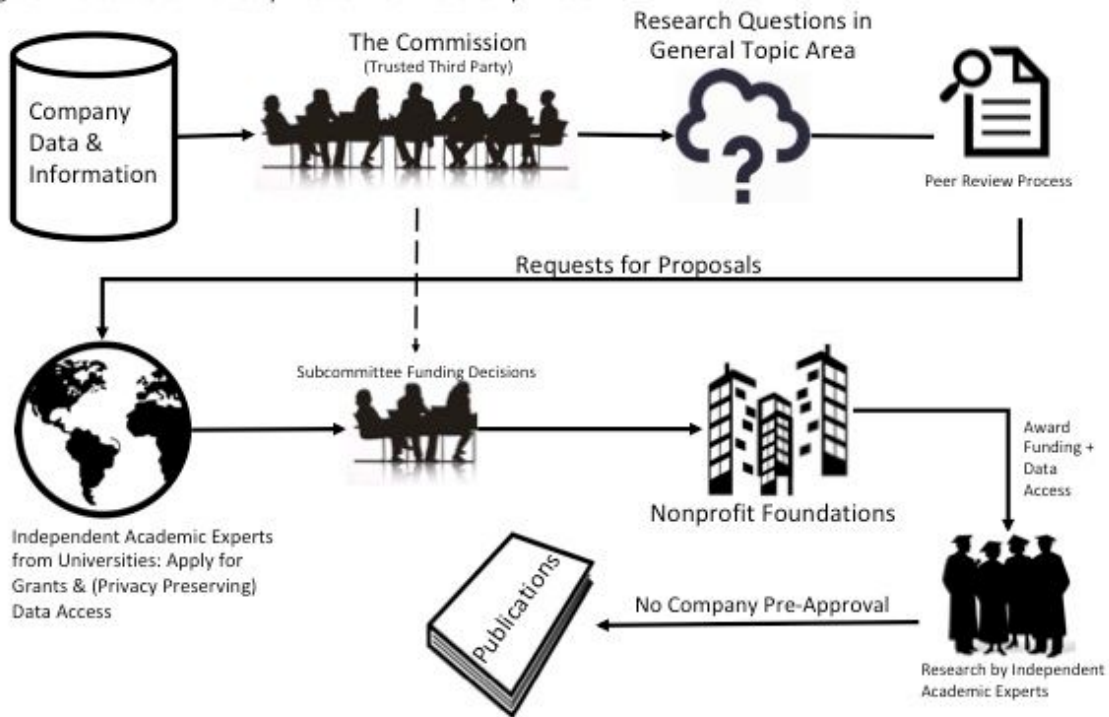
3. A Proposed Two-Part Solution

We now describe a organizational structure designed to reduce the difficulties described in Section 2. Our model ensures that the company's interests are protected, the data is kept secure and private, and the researchers publishing maintain independence. Our discussion in this section follows the outline in Figure 1.

The process begins by a company establishing a *general topic area* of research it is willing to pursue, such as the impact of social media on elections and democracy. Then within this area, we introduce a two-part organizational structure. In Part 1, we establish a *commission* composed of respected scholars which, as a trusted third party, receive access to all relevant parts of the company's operations under confidentiality agreements. The commission will receive answers to

all relevant questions about any platform, product, policy, or practice, including information about the company's systems and data, that can help it achieve its goals. It will run relevant statistical analyses by working closely with the firm's data scientists who, in any organization, typically have a wealth of information not available in formal written documentation.

Figure 1: Outline of Industry-Academic Partnership Model



For both legal and privacy reasons, not all of the information shared with the commission will be made public. This is the innovation underlying the two-part structure: the commission will have access to all information required to make informed recommendations, and will filter this information to the broader research community on its own accord, omitting proprietary and other specifically delineated information following agreed upon rules.

The process will only work if the commission has the trust of the broader academic community and general public. It is therefore designed to be composed of well-known, highly-respected, distinguished, senior scholars who represent the scientific community across important dimensions of demographic, regional, political, substantive, and methodological diversity. Like editors-in-chief at a scholarly journal, ultimate responsibility for the commission falls to its co-chairs, with input from its members, the peer review process, and others. The members act as advisors in their areas of expertise, like an editorial board. Commission members, organized into committees, also help the commission stay in contact with their academic communities by soliciting suggestions and ideas, and helping get the word out about commission activities.

To limit security risks and the burdens of service, only certain commission members will sign confidentiality agreements when necessary to their area of expertise. Because these members are effectively treated as firm insiders, and given full access to sensitive information, they are not free to publish research without pre-publication approval from the firm, probably will not publish from this experience at all, and are prohibited from responding to requests for proposals or receiving funding as described below (which is another reason why only senior scholars should be recruited to participate on the commission, at least in this capacity). Other commission members may apply for grants as part of commission activities, as our peer review process includes standard procedures to manage conflicts of interest. Members may also participate in the peer review process.

The co-chairs are jointly appointed by agreement between the firm and the nonprofit foundations. The co-chairs then appoint all other members with input from, but no decision making authority by, the firm or foundations. Commission members signing restrictive confidentiality agreements are compensated at fair market rates, and, in highly charged partisan or otherwise sensitive environments, are paid by nonprofit foundations independent of the firm.

The commission has the ability and indeed obligation -- without permission from the firm -- to report to the public about whether the firm is keeping its end of the bargain, providing the commission full access, and answering all relevant questions. To be specific, if the commission concludes that the company has violated its agreement and prevented it from providing any piece of information it needs to address the general topic area, it will report this in a visible public statement. Once the commission is established, it will have a responsibility to regularly report on its activities and the firm's to the public, including decision-making criteria guiding the research agenda, scholar selection, and overall progress.

In Part 2 of our structure, after the commission gets up to speed on all relevant internal data systems, policies, platforms, and practices at the firm, it identifies a series of important research questions, each of which it believes may be answerable with access to a specific, and privacy-preserving subset of the firm's data and systems, or with an appropriately and ethically designed new data collection procedure such as a randomized experiment. If answers to these questions can be ascertained from research on the platform and there are no legal or other agreed upon barriers to the research, then the commission follows standard academic procedures and announces an open grant competition for *independent academic experts* to receive funding to take on this work. This competition includes formal, public requests for proposals, peer review, and "revise and resubmit" processes (and ethical review as described in Section 4).

The peer review process reflects the model's two-part organizational structure. At the start, we follow procedures similar to that the U.S. National Science Foundation uses for its peer review

process, with multiple independent peer reviews by individual scholars and then panels of academics meeting to discuss each proposal and its reviews. Because the commission has sensitive confidential information about areas researchers are not permitted to pursue, such as due to ongoing litigation, it makes final decisions about which grants to award. The firm and the charitable foundations have no role in choosing reviewers or making funding decisions.

When grants are awarded, the independent academic experts receive funding through standard university procedures for sponsored research, and data access from the company. The process for researchers will thus be familiar, and simpler than most other industry-academic partnerships: They will simply be applying for and receiving a grant from a nonprofit foundation via transparent processes open to all, rather than only the well-connected.

Thus, academics may participate in the process we have set up in several ways. They may be selected to serve on the commission or as consultants, apply to be independent academic experts, or participate as peer reviewers. The commission will also solicit advice at several stages of the process, so academics may choose to provide help there as well.

4. Ethical Process Standards

Achieving consensus about ethical research principles is rare, and especially difficult as societal views morph in response to fast moving technological developments, increasingly informative data collection, and ever changing innovative products. Instead of trying to select specific rules that everyone agrees with, we institute the following nine rigorous ethical processes.

First, to ensure accountability for the actions of individual researchers, proposals may only be submitted by colleges and universities on behalf of faculty or others with Principal Investigator (PI) rights. (Students, post-doctoral fellows, and others may participate as co-PIs on faculty-led projects.) Before awarding access, the researcher's university must also be a party to all necessary data access agreements.

Second, to submit proposals, PIs must receive approval from their own university's Institutional Review Board (IRB), or the equivalent in other countries. Under U.S. federal regulations, applicants are not permitted to determine whether their research is exempt or otherwise meets the rules, and so all applicants must go through this process. Applicants from countries where their IRB equivalent does not certify Common Law compliance (mostly from outside the US and Western nations) must obtain certification from an external IRB, such as the Western IRB (see wirb.com).

Third, peer reviewers are asked to evaluate each proposal's scientific merit and its potential benefits to society, and at the same time are asked to review the ethical track record of the proposed investigator, and the potential costs of the research to research subjects and others. This process is designed to ensure that only responsible researchers are granted access in appropriate circumstances.

Fourth, all proposals that pass standard peer review are sent for a separate ethics review, by ethicists specializing in the types of data we will make available. This step is especially useful for universities with IRBs members who are not up to date on the ethical problems involved in social science analyses. This is unfortunately a common problem, in part because IRBs were originally designed for medical research and still spend most of their time evaluating research outside of the social sciences.

Fifth, the privacy of individuals represented in firm data must be protected. Any breach would damage the credibility of the researcher, their university, the process we have arranged to make data available for the academic community, the social good intended by the research, and the reputation of the company. As such, researchers' access to and use of such data will be held to higher standards for privacy, confidentiality, and security than required by any existing law or university practice. Data access rules will be calibrated to the sensitivity of the dataset to be analyzed. For datasets that raise no legitimate privacy concerns, data may be released publicly or with minimal safeguards, such as with much aggregate level data commonly released by social media firms. For the most sensitive datasets, researchers will need to work inside an actual or virtual company facility, and have their work continually monitored. For datasets with sensitivity between these two extremes, scholars will be able to access data on highly secure, encrypted laptops provided by the firm, where all data analysis (and literally every keystroke) can be audited. Such laptops will not contain the datasets themselves, but will serve as portals to access data on secure servers. These procedures effectively change from a regime of *individual responsibility*, where scholars legally agree to follow the rules and the rest of the community hopes they comply, to one of *collective responsibility*, where multiple people are always checking and the risk of improper actions by any one individual is greatly limited.

Sixth, social science insights are normally about population averages and broad patterns, and for which facts about any one individual are unnecessary and not of interest. Social scientists are usually interested in patterns about everyone, not anyone in particular. As such, privacy-protected analysis of certain types of data can be facilitated through cutting edge work in computer science and statistics, such as on "differential privacy" (Dwork et al., 2006; Gaboardi et al., 2016). For certain classes of data and related analysis, these techniques will lead to modified data sets or statistical analysis procedures that (one can show via mathematical proof) can enable social scientists to discover aggregate patterns with zero chance of being able to learn

or reveal anything about any one individual. This emerging field holds great promise to both protect privacy for individuals and advance scientific knowledge for all of society. As these techniques have not yet been developed for some types of data, researchers in this area should be enlisted to modify their techniques to facilitate social media data sharing.

Seventh, all funded research should follow the “replication standard” and thereby produce and archive replication data files (King, 1995). This means that published research completed under grants from this process should be replicable by other researchers, under specialized conditions that are developed and published. The privacy and confidentiality concerns of this type of research obviously complicate this process, but several procedures are available to respond to those concerns. For example, a formal citation should be established for every data set with a “universal numeric fingerprint” that uniquely identifies the content of a dataset even if the format in which it is stored changes (Altman and King, 2007) along with a persistent identifier that locates it. The code, methodological details, and metadata (but not data) will be publicly available in Dataverse (see dataverse.org). And the full replication archive, including the data and all procedures necessary to replicate the analysis should be available internally at the company, and accessible by academics.

Eighth, the independence of academic research from private firms and nonprofit foundations with substantive interests or ideological preferences must be protected. Having multiple foundations with differing perspectives can be very helpful especially for highly charged partisan or sensitive issues. When feasible, we recommend adopting rules to prevent any one foundation from having too much influence over the process. In other industry-academic partnerships -- such as with smaller companies, in less politicized environments, or in substantive areas where funding from nonprofit foundations is unavailable -- our plan’s two part structure still works with few modifications and without any added difficulties. The only real difference would be that the company may fund the commission, consultants, and outside experts directly.

Finally, because of the ever-changing nature of ethical understandings, researchers in ethics should be enlisted to study the commission’s decisions, how they are viewed by other academics and the general public, and how they might be improved. Such information should be used to improve the commission’s processes and decision making.

5. Application to Facebook

We developed our proposed model of industry-academic partnerships in the context of building a partnership with Facebook in the highly charged partisan atmosphere surrounding the issue of

foreign influence through social media in the 2016 US presidential elections and the UK Brexit referendum, immediately following the Cambridge Analytica scandal.

This application benefits considerably from the extraordinary participation of a large number of high profile, ideologically and substantively diverse nonprofit foundations. Having their endorsement, guidance, and funding -- and just the fact that they are working together with singular purpose to make this project a success -- eases considerably the difficulty of forging a partnership in the highly politicized domain that begins our project. We are grateful for and proud of our collaboration with the John and Laura Arnold Foundation, the Democracy Fund, the William and Flora Hewlett Foundation, the John S. and James L. Knight Foundation, the Charles Koch Foundation, the Omidyar Network, and the Alfred P. Sloan Foundation. (Since large companies have considerably more money than nonprofit foundations, we may at some point have additional funds flow directly from the company to grantees but, either way, the company will remain disconnected from all granting decisions to the independent academic experts.)

These foundations, which do not join together very often, fund all research we approve, thereby removing financial influence from Facebook or other private firms. Although those on one side of the ideological and partisan divide may not trust those on the other, we hope everyone recognizes the advantages of having all these foundations participate together. The foundations have also agreed to the following additional processes to protect the academic integrity of our decision making: (1) The foundations take no formal role in approving any of the grants. (2) We will not use funds from any one foundation (or viewpoint) in isolation to fund any one study. (3) Funding from all foundations is pooled and sent to the Social Science Research Council (SSRC), which then regrants to universities that house the approved research projects. Researchers report in publications and on their vitae receiving funds from the SSRC, not from any one foundation supporting our project. (4) All of this project's activities, including grant giving, decision making, committee appointments, etc., are supported by the collective views of the foundations in a manner so that no one can dominate the others on any issue. The foundations advise, and the academics on the commission decide. And (5) each foundation may express its opinion to the commission, but will have no voting power to change its decisions. The commission makes all decisions about grants with full academic freedom according to the highest and most rigorous standards of science. We are grateful to the foundations for their generosity and for supporting these principles.

We have also arranged for the SSRC to oversee the peer review processes for our project, with the commission retaining ultimate decision making authority on awarding grants. The SSRC will also issue requests for proposals defined by the commission. (SSRC will also subsidize costs of applicants from developing countries who must obtain certification from an external IRB to ensure Common Law compliance.)

By mutual agreement among the foundations, Facebook, and ourselves, the general topic area for our project will be research on the implications of social media and digital technologies in the world -- starting with democracy and elections. Here is Facebook's description:

“The focus will be entirely prospective, with the goals of understanding Facebook's impact on upcoming elections — including in Mexico, Brazil, India, and the United States — and informing future decisions. The research sponsored by this effort will have benefits both for our understanding of social media's effects on democracy and for Facebook to better understand whether it has the right systems in place, i.e. are we effectively able to fight the spread of misinformation and foreign interference? Specific topics may include misinformation; polarizing content; promoting freedom of expression and association, protecting domestic elections from foreign interference; and civic engagement.”

Finally, we have established a collaboration with the SSRC and the PERVADE group (Pervasive Data Ethics for Computational Research; see pervade.umd.edu), a six-institution, NSF-funded research project on data ethics. PERVADE will assist us in conducting research on our processes, and reporting progress to us and to the public in a visible, transparent way, so that we will be able to continually improve ethical compliance in a manner understood and appreciated by academics, industry, and the public at large.

6. Incentives to Cooperate

The structure of any industry-academic partnership must satisfy a company's legal, fiduciary, and business needs; academics' need for scientific freedom to work and publish; and the public's need for privacy and potential social goods derived. The basis for the partnership, then, is a structure, process, and purpose that is incentive compatible for all involved.

Our plan is incentive compatible for a company, because it (a) decides on the commission co-chairs along with the funders; (b) chooses the general topic areas that may be studied, given personnel and other resource constraints; and (c) retains the ability to exercise control in the event a research project would violate the company's legal obligations, interfere with ongoing or imminent litigation, violate privacy, or compromise proprietary information or competitive standing.

The commission's role is to simultaneously protect the company, the public, and academia. It must ensure that the definition of research questions and formal requests for proposals not be so

narrowly stated that they also predetermine the answer. In that circumstance -- where no one is vulnerable to being proven wrong -- nothing of value to science can be learned, and academics would be uninterested in participating. At the same time, few companies would participate in facilitating research designed solely to evaluate its own actions, at least not without the ability to learn how to improve its products or services going forward. If either of these outcomes seems likely, no industry-academic partnership is possible. And if the company constrains questions in ways that violate this agreement, the commission will follow its obligation described above to report to the public that its broader goals will not be met because of actions taken by the company.

Academics would probably prefer that companies have fewer rights to choose questions, so they can access any data they wish, but no firm will (or legally could) go forward without these rights. Insisting that they give them these rights would mean no data-sharing (except with pre-publication company approval), which gets us nowhere. Moreover, just as many requests for proposals from nonprofit foundations and governments allow for only a circumscribed set of topics they choose, companies have this right under our proposal as well. For-profit and not-for-profit organizations may have different motivations for providing funding for certain questions and not others, but requests for proposals from all are constraining to some degree.

Individual customers, whose data was gathered beginning with their decision to sign up for a technology firm's service, have the legal and ethical right to privacy. They have normally agreed in the "terms of service" for their data to be used for research, but we must ensure they benefit from the results of this research. The structure of our project is designed to reduce the risks of privacy violations and maximize the potential benefits from the research, but it is also incumbent upon the commission to communicate the tradeoffs clearly. Fortunately, there is precedence for successful communication of this tradeoff in many other areas of research. (Unger et al., 2016)

The optimal way forward, then, is to find research questions that are of intellectual interest to the scientific community and either provide valuable knowledge to inform product, programmatic, and policy decisions, or are orthogonal to company interests. Of course, any company participating in this process must understand that the point of research is to learn new things, discover answers to existing questions, and find new questions never before conceived. As a result, some bad news for the company will sometimes unavoidably surface. But even that bad news can be useful for the company as it improves its products. If successful, the results for everyone involved and many others should be a great deal of social good for the public as well.

7. Concluding Remarks

One might reasonably wonder whether now is, in fact, the time to discuss a data sharing program between internet companies and academics. Concerns about privacy are rightly at the forefront of everyone's mind in the wake of recent revelations. After all, the notorious recent "Cambridge Analytica" scandal began with a breach by an academic (acting as a developer) of a developer's agreement with Facebook, which barred his sale of the data to a for-profit company. That scandal is an academic scandal as well.

Yet, for this reason, now is precisely the time to have this conversation and to invent and promulgate structures that protect users' privacy while allowing independent academic analysis of social media data. If we do not develop these institutions, only the firms themselves will have access to the data on some of society's most pressing challenges, including, most immediately, the impact the new social media environment has on democracy. Absent such an effort, many of those outside of large technology companies, including academics, commentators, and government regulators, will continue to distrust the companies' representations that they understand the extent of the problems, have conveyed them accurately, or have implemented adequate solutions. With this new approach, however, we can take a critical step toward independent analyses of the dynamics of social media's effect on society, which will have downstream benefits for both the general public and the firms, and can begin to tackle numerous other societal problems.

The key features of our approach include independence of scientific research from undue private influence; access to a major company's data under conditions incentive-compatible for the firm, individuals, and nonprofit organizations; a model for industry-academic engagement tailor-made to the unusual nature of the firms and the data they house; and deployment of the scientific community to help advance societal good with previously inaccessible information. Achieving these difficult objectives requires, for any one implementation of our model of industry-academic partnerships, delicate and often extensive negotiations throughout the process of structural organization, question definition, empirical research, and eventual publication. But the questions are too important, the potential advances too large, the range of knowledge that could be learned too significant, and the information about the greatest challenges of society too valuable to miss the advances the scientific community can bring to the table.

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