Collaborative Working Between Academia and Industry: An Educational Scenario by the EnTIRE project

Background

Six early-career researchers based in various faculties of Zarvard University have recently responded to an email that sought collaborators to explore the impact of social and economic incentives on driving habits. The group is directed by Christine, an ambitious principal investigator with an extensive network of connections all over the globe. She recently joined Zarvard business school. Currently, Christine and the six researchers are trying to find useful data from public sources, but after the introduction of data protection laws and scandals involving breaches of privacy, it has become extremely challenging to obtain large datasets that would be useful for this project.

Christine wants to use her network to get hold of useful datasets. Previously, she was a senior manager at ZUBER, a ridesharing software giant based in Silicon Valley. Although Christine is officially no longer associated with ZUBER, she is well-connected to her previous colleagues and is still a shareholder.

Issue 1

During a casual lunch meeting with one of her close friends from ZUBER, Christine learns that ZUBER is testing a new feature called Live Driver Monitoring (LDM). Aimed at improving passenger safety, LDM will send live reports to the ZUBER central database about the extent to which drivers adhere to road rules. Drivers who transgress road rules will have a lower chance of getting premium clients in the random allocation of passengers. ZUBER managers hope that the introduction of LDM will improve the driving culture among ZUBER drivers and enhance customer safety and satisfaction.

Required personal data for the LDM feature includes a driver's ZUBER profile, geolocation, and driving directions. A limited pilot of the

LDM feature has commenced in the city of Zublin. ZUBER's current Terms and Conditions clearly state that the company "owns drivers' cruising data, and also, has the right to use it for analytics purposes and to improve the mobile application. If required, the data might be shared with business and research partners."

Given the lack of publicly available data to work with, and ZUBER's eagerness to improve passenger safety, Christine thinks that collaboration between ZUBER and Zarvard could benefit both parties. She contacts Krishna (the director of Research and Development (R&D) at ZUBER) and explains that she learned about the LDM feature through a common acquaintance. Given her knowledge of the company's global strategy and her new position at Zarvard, she suggests the following:

If ZUBER provides their (anonymised) LDM data that was collected in Zublin, Christine's team will analyse it and share their results with ZUBER, which may improve passenger safety.

1a. Questions for Researchers

1. If you are one of the researchers who may find ZUBER's reports beneficial for research purposes, it is perhaps useful to check whether the data was collected in an ethical manner. Additionally, if the data is collected by non-academic partners, it is important to note that these partners may use different codes of conduct and guidelines for data collection involving human subjects. Given that the data is anonymized, are there other issues to consider in using ZUBER's data? If so, what are they?

2. Do you recognize any conflicts of interests? If so, what are they?

1b. Questions for Research Administrators

1. Should hiring committees have a separate assessment process (including different forms, criteria and ranking schemes) for candidates who used to work in a non-academic environment?

2. Given the growing trend of collaborative projects between academia and industry, what are the challenges of defining conflicts of interests and preventing them?

3. Is your institutional code of conduct clear about conflicts of interests and the associated sanctions?

1c. Questions for Research Ethics Committees and Research Integrity Offices

1. Data protection laws and precautionary measures to protect privacy might prolong the time needed to complete data collection and, consequently, increase the costs of conducting research. This dynamic may encourage researchers to outsource the data collection process and involve third parties who own user data. What are the best practices for using data that was collected by non-academic partners?

2. When using such data, what ethical issues demand consideration?

3. In cases where research groups locate third parties who own user data, how would the process of submitting an application to the research ethics committee change? (Is it possible to submit an application after the data collection phase?)

4. The European Code of Conduct for Research Integrity (ECCRI) suggests: "All partners in research collaborations agree at the outset on the goals of the research and on the process for communicating their research as transparently and openly as possible." Upholding this principle may be challenging in cases like the ZUBER experiment because goals are not clear at the start of the collaboration. Furthermore, non-academic partners with financial interests might not be interested in (any) communication of research results. If Christine sent a request to Zarvard's Research Integrity Officer for advice on how to set goals for the project, what would be a reasonable response?

After a few meetings with her old colleagues at ZUBER, Christine lays the groundwork for collaboration between ZUBER and Zarvard. Data collected from ZUBER drivers in the city of Zublin is anonymized by ZUBER and then delivered to Christine for further analysis. She makes sure that driver data is stored safely and shared with the group according to the highest standards. After three months, Zarvard researchers send their first report to Christine. Among other results, their analysis shows that speeding is more likely to happen when drivers are on their way to pick up passengers, but when the passengers are in the car, drivers hardly exceed the speed limit. Parking in restricted areas, however, is more likely to happen when drivers are alone and waiting for passengers.

Using the reported results, Christine creates a presentation in preparation for a meeting with ZUBER's managers. After the presentation, Krishna from R&D suggests further collaboration in the upcoming phase of the pilot, which will include data from other cities. Christine, however, indicates that she wants to send these results to a high-impact journal before any further collaboration. She argues that submitting a manuscript is beneficial because the methodology will be scrutinized by experts. Therefore, the review will help the group in refining their methods for any future analysis. In addition, publication of the current results will help the group to acquire more financial and human resources. She says that these resources will be useful in the next phase of the project.

In fact, Christine has been proactive and prepared an outline for a manuscript, which she hands to Krishna. The manuscript will have nine coauthors; the six researchers from Zarvard, Christine's friend who informed her about the LDM, Krishna and Christine (as the last author). Krishna asserts that given his employment at ZUBER, he is not interested in being mentioned in the manuscript. Nevertheless, he wants to have a look at the final version prior to submission to check whether there is any aspect that may harm ZUBER's reputation. He also suggests that their common acquaintance be removed as an author.

Christine agrees with all Krishna's suggestions and remarks. After some time, she sends the

final version to Krishna for review. The manuscript starts with an introduction, and proposes the following hypothesis:

- Accompanied drivers are more likely to adhere to road rules.

After accepting the hypothesis, the paper concludes that since speeding is less likely to happen when taxis carry passengers, taxi driver behavior seems to be positively influenced by social circumstances (i.e. the presence of a companion). As a final recommendation, the manuscript suggests that since the presence of companions results in adherence to road rules, ridesharing should be considered as a form of public transport, and the companies that facilitate it should receive tax breaks.

Krishna finds the manuscript interesting and in line with ZUBER's global strategy. He agrees to its submission.

2a. Questions for Researchers

1. With the growing importance of big data and the availability of statistical software programs that speed up the analysis of large datasets, it is possible to analyse the dataset first and then formulate a relevant hypothesis. However, this practice is unethical and damages the integrity of research. What can go wrong when groups hypothesize after conducting different kinds of analyses on massive datasets?

2. In what ways does Christine selectively report the research results?

3. If you were a young researcher in a group and did not agree with either the conclusions or the recommendations, how and with whom would you raise your concerns?

4. In some collaborative projects that lead to a publication, individual contributions and responsibilities about the content might not always be clear.

5. It is safe to argue that without the information from Christine's acquaintance at ZUBER, there would be no research collaboration. Could one argue that Christine's friend has made a significant contribution to the research and meets the ECCRI's condition for authorship? Should Christine's friend be added to the author list?

6. If you were a young researcher in a project and felt uncomfortable about the inclusion of some coauthors in the manuscript, how and with whom would you raise your concerns?

2b. Questions for Researcher Administrators

1. In collaborative projects between academia and industry, research results might yield substantial financial gains for the commercial partners. In cases where the academic institution is funded by tax-payer money or benefits from public subsidies, it is perhaps reasonable to expect industrial partners to return some form of good to academia/society. When evaluating potential collaborators in industry, how important is their record/policies regarding corporate social responsibility and donations to academic institutions?

2. How can research administrators prepare themselves to negotiate better terms for their institution in cases where research results would yield substantial financial gains for the commercial partners?

3. Preregistration is believed to be an effective method in preventing "HARKing" ("Hypothesizing After the Results Are Known"). Proponents of open science have developed several free platforms for the preregistration of studies in various research areas. What would encourage researchers to proactively preregister their research projects? How do you encourage researchers in your institution to preregister their research projects?

4. In projects that involve collaboration between academia and industry, some non-academic partners may find it unacceptable to preregister. Industrial partners may argue that preregistration reveals information about their areas of interest long before the results are known, and this could benefit their competitors. What would be your advice to research groups with partners who are reluctant to preregister?

2c. Questions for Research Ethics Committees and Research Integrity Offices

5. Although preregistration of studies is becoming more common, it is still not mandatory, and for the most part, challenging to enforce. What role can research ethics committees play in promoting preregistration? Should preregistering studies that involve human subjects be a necessary condition for research ethics committee approval? What are the reasons for your answer?

6. Should research ethics committees have different review processes for preregistered and non-preregistered studies?

7. In collaborative research projects, individual responsibilities are believed to be diffused. According to the ECCRI, all coauthors "are responsible for the integrity of the research." If Christine does not have the skills to scrutinize and check the quality of the work of all the researchers involved in a publication, how can she ensure that the analysis was done thoroughly and responsibly?

Issue 3

With Krishna's approval, Christine finalizes the manuscript and submits it to a journal. After a month, the editor contacts the corresponding author (Christine) with a decision: "authors are encouraged to resubmit, should they be prepared to incorporate *major revisions*." Christine learns that this decision was made after two anonymous reviewers read the manuscript and provided their feedback. The second anonymous reviewer states that:

"…This is indeed an interesting study, but I am concerned about the unforeseen application of this research and its results. For instance, has the research group envisaged measures to prevent local traffic authorities from accessing their dataset (should there be a legal mandate for accessing results)? What if traffic authorities made requests to use the data to (retrospectively) penalize ZUBER drivers who have exceeded the speed limit or parked in restricted areas?..."

After reading the anonymous reviewers' comments, Christine comes up with a new idea and decides to take the research to a

whole new level. She decides to withdraw the manuscript and, instead, conceives a much more sophisticated experiment to make her results more comprehensive.

She remembers that Amar, who was one of her classmates in college, is now working as a director in the Traffic Office in Zangladesh (TOZ). After doing some research about the TOZ and ZUBER's market share in Zangladesh, she contacts Amar and proposes the possibility of a collaborative project involving Zarvard, ZUBER and the TOZ. She drafts the following email to that effect:

"… My research group in Zarvard is interested in exploring the impact of social and economic incentives on driving habits. We have analyzed the driving habits of ZUBER drivers in a European city (see attached report) and would like to conduct a more elaborate experiment. I was wondering whether TOZ would be interested in participating in the next stage of this project.

Here in Zarvard, we have developed a sophisticated workflow that creates live reports about the driving offences of ZUBER drivers. If we can find a constructive framework for collaboration, we might be interested in testing our workflow on ZUBER drivers in Zangladesh. To better analyze the social and economic impact of incentives, we would like to inform ZUBER drivers that data

regarding their behavior will be sent to TOZ. Given that ZUBER holds 85% of the total taxi market in Zangladesh, we believe that this collaboration could provide enough subjects for our experiment. Moreover, this experiment may deter drivers from breaking road rules and improve road safety in Zangladesh, where road deaths are among the highest in the world. At the moment, reports include various driving offences such as speeding, stopping/parking in restricted areas and illegal entry on to one-way streets."

After a week, Amar indicates that TOZ is happy to participate should Christine send more concrete plans including a list of requirements/deliverables, and agree with Amar's conditions:

"… The new government in Zangladesh has promised to tackle reckless driving behavior. TOZ has a responsibility to decrease the number of road deaths. We have started *safe-driving* campaigns but currently have no other means to measure the effectiveness of our campaign other than the annual comparison of fatal accidents. If your system could generate monthly reports that show the adherence of drivers from different age and gender groups to road rules, we would be able to adjust our campaign strategy. Additionally, the latest TOZ statistics show that illegal reversing on

highways is one of the most common causes of fatal accidents. Can the system be adjusted to report illegal reversing? Clearly, TOZ will sanction drivers accordingly and use the collected fines for further promotion of our safe-driving campaign and the improvement of road infrastructure."

Subsequently, Christine sends an email to Krishna and ZUBER's CEO. After introducing her new plans for the project, Christine informs them about her ideas to collaborate with TOZ as well as Amar's requests. Christine asks whether the company will support her. Krishna asserts that registering and reporting illegal reversing is possible. The CEO also reacts positively and links Christine with ZUBER's regional manager, who oversees the Zangladesh market. The CEO speaks highly of Christine and says that this project may change the future of ridesharing.

Subsequently, Christine sends an email to her research group at Zarvard and mentions that the editorial team has been very demanding and ruled against the publication of their manuscript. Consequently, she has decided to collect and use more meaningful data, for which she has also found a new partner, namely, TOZ. She notes that the group will not publish their results in the same journal. Christine asks the group to keep their spirits positive and refers to this new stage of the project as "a significant leap forward that should be kept confidential" until she finds the right journal for its publication.

3a. Questions for Researchers

1. The input provided by peer-reviewers may be of significant help to projects. In some cases, reviewers' contributions may even spark new directions for research. These contributions are often recognised in the acknowledgement section of journal articles. However, sometimes it may be difficult to describe and verbalise these contributions. Can you describe the contribution (if any) of the second anonymous reviewer to the research so that it could be acknowledged in a future paper?

2. Senior members of research projects have leverage over other members. For instance, the six early-career researchers from Zarvard would not have known what the journal's response to Christine entailed unless she communicated it with them. The ECCRI, however, suggests that "All partners in research collaborations are properly informed and consulted about submissions for publication of the research results". As a co-author, do you always expect the corresponding author to communicate their correspondence with the journal to you? Have there been instances where corresponding authors did not do that? What problems arose as a result?

3. If you were an early-career researcher at Zarvard who received Christine's email about her correspondence as well as her request to keep the information confidential, how would you react?

4. The ECCRI suggests that "all partners in research collaborations agree at the outset on the goals of the research and on the process for communicating their research as transparently and openly as possible." Given that the group had planned to publish their initial results, and the journal also indicated that their results are publishable (should they revise it according to their feedback), non-publication of results may be seen as problematic. Are there any compelling reasons for non-publication of research results?

5. What are the regulatory requirements for altering research goals or adding new objectives as research moves forward?

6. What do you think about Christine's style of communication and her overall approach to managing the project? How could both be improved in line with standards of research integrity?

3b. Questions for Research Ethics Committees and Research Integrity Offices

1. The ECCRI suggests that "all partners in research collaborations are properly informed and consulted about submissions for publication of the research results." Nevertheless, it is only the corresponding author who is in contact with the editorial team. As shown in the ZUBER case, corresponding authors may selectively share their correspondence (with the journal) with other coauthors. How can transparent communication in collaborative projects be encouraged and promoted?

2. If you were a research integrity officer at Zarvard and received a complaint by one of the early-career researchers about Christine's lack of communication regarding the editors' response and her contact with TOZ, how would you respond?

3c. Questions for Research Administrators

3. Questionable communication practices (e.g., inaccurate reflection of editorial responses to co-authors) may be seen as a success factor that helps researchers in advancing projects. How should guidelines and policies address communication issues such as a PI's effective and fair communication with early-career researchers?

4. How can research administrators promote a healthy balance between being ambitious and being ethical in the conduct of research?

Issue 4

Before collaborating with TOZ, Christine works towards submitting an application to the Research Ethics Committee at Zarvard. She explains the data collection process and how ZUBER drivers will be monitored. She also highlights the social benefits of this experiment in terms of increasing road safety. In order to adhere to the standards of good research practice, Christine uses the ECCRI and makes a reference to the following paragraph:

"All partners formally agree at the start of their collaboration on expectations and standards concerning research integrity, on the laws and regulations that will apply, on protection of the intellectual property of collaborators, and on procedures for handling conflicts and possible cases of misconduct."

Accordingly, in her application, she argues that since the experiment is being conducted in Zangladesh, the group will be using Zangladeshian regulations and standards concerning research integrity. Any possible conflicts or cases of misconduct will be dealt with according to Zangladeshian law.

The committee evaluates the application and requests revisions. In particular, the committee is concerned about the conditions for consent and argues that since most drivers will not have read the Terms and Conditions, the group should consider other methods to ensure that drivers are fully informed. Moreover, the group should ensure that drivers are not being coerced to participate in this experiment. Furthermore, opt-out options should be included.

In response to the committee's concern, Christine adds the following statement to the revised version of the research ethics submission:

"Exact details of how the system works will be added to the T&Cs of the ZUBER users in Zangladesh. Given that most mobile users in Zangladesh do not read the content of the T&Cs, the question about the LDM feature will be communicated with them via a separate audio message in the local language to their mobile, to which they will have to listen and reply (free of charge) in order to use the app. Drivers will be allowed to agree to participate or to opt-out. Those who agree are awarded a new *Monitored Driver* badge on their profile. Even after the initial agreement, drivers can opt-out using a free-of-charge text messaging service at any time. If they opt-out, then they will lose their *Monitored Driver* badge."

The research ethics committee is satisfied with the changes and approves the application. After four months of hard work and intense interaction between Zarvard researchers, TOZ and ZUBBER, the system is installed, and the experiment is in full swing.

4a. Questions for Research Ethics Committees and Research Integrity Offices

1. Guidelines about research ethics and integrity, and the extent to which these guidelines are enforced may vary in different countries. In cases where guidelines provide different definitions of misconduct (or other important aspects such as authorship), these differences may create problems. For international collaborations where there are more than one applicable set of guidelines for research conduct, which one should be used?

2. What considerations should be taken into account when research groups use guidelines of another institution/country?

3. Members of the research ethics committee may have limited access to resources from other countries. For instance, codes of conduct, study materials and reports might only be available in the local language. Moreover, when analysing applications that involve international collaborations, research ethics committees might have limited knowledge about the conduct of research in other countries. If you were analysing Christine's research ethics submission, would you have considered the revisions satisfactory? Please explain.

4. What other potential ethical issues could possibly arise in the ZUBER experiment in Zangladesh? How should a research ethics protocol look to address those issues to the satisfaction of a research ethics committee?

4b. Questions for Research Administrators

1. The rapid growth of international collaborations may complicate the conduct of research. For instance, in cases where researchers from the developed countries collaborate with researchers based at institutions in the global south, unforeseen circumstances might complicate the dynamics of the collaboration. The disparities in the availability of resources and research skills (of researchers) on the one hand, and differences in terms of regulations and the extent to which they are enforced on the other hand, may generate problems. How should researchers from developed countries be prepared for collaborations that involve researchers and research institutions from the global south?

2. How should researchers from the global south be prepared for collaborations that involve researchers and research institutions from developed countries?

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Suggested Resources

For Researchers:

ECCRI: The European Code of Conduct for Research Integrity
ORI: Age-old Conflicts
COPE: Withdrawal of paper at proof stage
COPE: Undeclared conflict of interest
Retraction Watch: Should a paper be retracted if an author omits a conflict of interest?
TAO: We Would Like to Withdraw Our Manuscript!
Online Ethics Center: Big Data and Public Health
American Psychological Association: Determining and negotiating Authorship

For Research Administrators:

ECCRI: The European Code of Conduct for Research Integrity
European University Institute: Academic Careers Observatory
EACEA National Policies Platform: Eurydice
OECD: Best Practices for Ensuring Scientific Integrity and Preventing Misconduct
Science Europe: Seven Reasons to Care about Integrity in Research
Free online report: Doing Global Science: A Guide to Responsible Conduct in the Global Research Enterprise

For Research Ethics Committees and Research Integrity Offices:

ECCRI: The European Code of Conduct for Research Integrity
Science: Investigation reveals widespread double dipping in NIH program to pay off school debt
RRI Tools: Responsible Research and Innovation Toolkit
Ethicsweb: European Research Ethics
Free online report: Emerging and Readily Available Technologies and National Security
Embassy of Good Science: Thematic pages, Open Science
Embassy of Good Science: Thematic pages, Balancing Harms and Benefits

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