Making Changes in the Academic Incentive System
HIBAR Research Alliance Discussion Paper

AN OVERVIEW

Recent academic and public discourse suggests society would benefit if more research was focused on addressing societal problems. One form of such research, described as Highly Integrative Basic and Responsive (HIBAR), is particularly impactful while also improving academic excellence. HIBAR research has historically been highly generative, leading to breakthroughs such as the transistor and penicillin, and, indirectly, the internet, cell phones, and the GPS system. Academic researchers in all fields (including social sciences, humanities, science, engineering, and medicine), working alongside societal partners that bring key expertise, have much to offer in the diverse collaborations that are central to most HIBAR projects.

A research project is considered fully HIBAR if it combines basic and responsive research in all four of the following key ways:

- Integrating motivations, through a desire for discovery and an intent to solve problems;
- Integrating methods, using traditional academic investigation and creative methods;
- Integrating leadership, by academics co-leading projects with societal partners;
- Integrating time frames, by maintaining a strong sense of urgency over a long haul.

The HIBAR Research Alliance (HRA) brings together contributors from research universities and related organizations, with a goal of catalyzing a system-wide increase in HIBAR research, from about one project in 20 today, to one in 5 by 2030, while strengthening all types of research excellence. Participants in HRA activities recognize that progress toward solving society's critical problems can be greatly accelerated if university-based researchers and non-academic researchers work together more often as equal partners. HRA activities are aimed at improving academic culture, using established organizational change methods, so that universities can become better partners, as well as catalyzing and supporting key changes identified by other organizations.

To achieve this goal, universities must ensure that academic incentive systems, specifically with regard to promotion and tenure processes, are appropriately aligned to encourage more and better HIBAR research. Aspects of the current promotion and tenure system discourage faculty researchers from working on HIBAR research projects, and we aim to encourage a discussion among those who are in a position to influence and directly make the necessary changes. This discussion will identify what specifically needs to change, how it should change, and actions that we can take individually or together in order to make these changes happen in a timely manner.

This paper is intended to encourage discussion among the broad stakeholder community. All interested individuals and organizations are sincerely invited to join the discussion.

Making Changes in the Academic Incentive System

HIBAR Research Alliance Discussion Paper

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Introduction

Recent academic and public discourse suggests society would benefit if more research was focused on addressing societal problems. One form of such research, described as Highly Integrative Basic and Responsive (HIBAR), is particularly impactful while also improving academic excellence.[1] To help better reflect their social contract with society, universities must ensure that academic incentive systems are appropriately aligned to encourage more and better HIBAR research.

Aspects of the current incentive system, particularly regarding promotion and tenure, discourage faculty researchers from working on HIBAR research projects, disadvantaging university stakeholders. An HRA Collaborative Action Group focusing on this challenge identified a compelling need for a modest change in the incentive system in order to enable an increase in HIBAR research while maintaining high standards of research excellence and simultaneously not penalizing researchers pursuing primarily basic research. In this discussion paper we describe the Collaborative Action Group data collection process aimed to helping understand the current state of the promotion and tenure process, as well as identifying specific opportunities for change.

Purpose of the discussion paper

We aim to encourage a discussion among those who are in a position to influence and directly make changes in the promotion and tenure system. This discussion should identify what specifically needs to change, how it should change, and actions that we can take individually or together in order to make these changes happen in a timely manner. Such changes will likely vary substantially by field and organization, but the joint effort moving toward a shared goal is key to

[1] As background reading, we provide a more detailed definition of HIBAR and the HIBAR Research Alliance (HRA) in Appendix A.

ensuring the additive nature of the various changes helping with the larger goal. Every action towards this goal, both big and small, helps to raise the tide and lift us all jointly.

While this paper focuses specifically on changes needed to encourage more faculty researchers to engage in HIBAR research, it is part of a larger, important conversation related to improving the academic incentive system. A number of organizations[2,3] are focusing on different aspects of this improvement challenge, and many of the actions and best practices they describe are relevant to the HIBAR change effort described here.

This paper does not make specific recommendations but rather it identifies key aspects of the current promotion and tenure system that currently discourage faculty researchers from engaging in HIBAR research projects, in an effort to identify targets for change. We also summarize other insights that surfaced while preparing the paper. While the intent is not to make specific recommendations, some possible initial actions to overcome known barriers surfaced during our data collection. We collected these and categorized them based upon the categories of people able to implement such changes. These are intended to merely be a starting point. They will evolve as more people join the discussion and commit to making changes within their various domains.

Preparation of the discussion paper

The Collaborative Action Group consulted with a number of key stakeholder groups about their experiences with the promotion and tenure system specifically with regard to societally-impactful research. These consultations took place with a range of people (17 individual interviews and many additional informal and group discussions over 12 months), including: senior university leadership such as provosts and deans, current and past members of promotion and tenure committees, early career faculty, people involved in past efforts aimed at modifying the promotion and tenure system (whether ultimately successful or not), current university researchers (both HIBAR/basic & junior/senior), and HIBAR researchers who left universities in order to pursue their research goals. The Collaborative Action Group members also consulted with other groups pursuing similar discussions and assessments of changes that are needed within the promotion and tenure system. The interviews, consultations, and background reading constitute our data for the paper. We make no claims of comprehensiveness, but believe it is time to broaden the discussion by including others using this as a common shared starting point.

[2] In Appendix B, we provide a list of some of the organizations convening discussions related to improvement in the academic incentive system.

[3] In Appendix C, we provide a list of some of the publications and other resources related to the need for improvement in the academic incentive system.

Insights learned from consultation discussions

We identified three key barriers within the promotion and tenure system that discourage faculty researchers from engaging in HIBAR research projects:

True impact is difficult to assess: The promotion and tenure process focuses on things that are easily quantifiable, regardless of whether or not such measures relate to the true value of the impact of the work. Although impact may be the desired outcome, it is difficult to assess as it generally does not lend itself readily to quantification. So many of the common metrics relate instead to the academic process (publications in a limited set of academic journals, academic citation counts, # of grants, graduate students, etc.) rather than the outcome. This encourages faculty researchers to narrowly focus on the process itself instead of the outcome.

Promotion and tenure processes emphasize independent work: HIBAR research often requires a team of researchers (at least two – one academic and one skilled external partner) whereas the promotion and tenure review process in many fields more highly values independent work.

Disconnects/misunderstandings with promotion and tenure expectations: There seems to be a common misunderstanding at initial (such as departmental) levels of the promotion and tenure process that higher levels will not look favorably on "untraditional" cases, resulting in initial levels excessively focusing on process measures. In contrast, higher levels are often quite willing to positively evaluate cases based on outcomes.

A number of other important insights emerged:

- Academic excellence is, and should always be, of paramount importance in the promotion and tenure system.
- The tenure system was largely intended to protect academic freedom, but the way the system has been set up, it encourages behaviors that are not aligned with this overall purpose.
- HIBAR research is risky, making it difficult for pre-tenure faculty to become involved.
- There is considerable variation in the promotion and tenure process at different schools. (For example, a senior faculty committee structure is common, but not universal.) There is also considerable difference globally, though these differences are no greater in any particular region. The barriers to HIBAR research seem to be very similar everywhere.
- There are some universities, and specific departments within other universities, that have made headway in addressing the promotion and tenure challenges described here, and it would be helpful to include people from those universities in these discussions, in order to better understand their approach and to see if there are elements that could be adopted more broadly in the university system.

- The promotion and tenure system tends to incentivize early specialization in a narrow research field, which may limit the degree to which the research can have widespread societal impact.
- In some fields, the barriers to HIBAR research faced by faculty members in the research granting process are an equally big hurdle as those in the promotion and tenure system, and in some ways are perhaps more of a hurdle because in many fields faculty members have to be able to get significant research funding in order to progress at all in the promotion and tenure system. The grant funding options may determine the HIBAR vs. non-HIBAR path more so than the promotion and tenure incentives in such fields.

Next steps

As described earlier, this paper is intended to initiate discussions among those who are in a position to influence and to encourage participants to identify specific actions that they can take to encourage faculty researchers to engage more often in HIBAR research projects. This can include increasing certain HIBAR factors even without converting a project to fully HIBAR. We hope that they start to take those actions, and communicate with others who may be in similar positions to help such actions spread.

In this section we list some example actions for different categories of people in influential positions. Please note that these categories and actions are only presented as examples to seed discussion and inspire new ideas - the specific people in influential roles are likely to have much better and more specific ideas to contribute in terms of what they can and should do given their domains of expertise and decision making authority. We will establish a mechanism that can keep track of such ideas as they get generated to serve as a basis for toolkits available to any decision maker interested in encouraging more HIBAR. This document is a seed to help such a community grow.

Example actions that we can take, individually and together:

University Leaders can:

- Review statements and other documentation that describe the university's commitment to scholarly work, making changes when necessary to ensure inclusion of scholarly work that focuses on having impact (i.e. HIBAR)
- Review the university's guidelines on promotion and tenure, making changes when necessary to ensure they recognize and value scholarly work focused on having impact
- Communicate any changes that are made to these statements or guidelines to further emphasize the university's strong support of HIBAR with a focus on ensuring lower level departments, committees, and individual scholars are aware of such support
- Enable appropriate training of evaluation committees throughout the promotion and tenure process, to ensure that the practice is consistent with the overall university guidelines
- Celebrate successful promotion and tenure cases that include exemplary HIBAR projects
- Express support for improving the ways in which research output is evaluated by signing on to the Declaration on Research Assessment (https://sfdora.org/)
- Encourage the development of "HIBAR champions" (widely respected and credible researchers) within each field to help assess outcome impact in a non-process metric way
- Widely inform faculty of these efforts and encourage them to get engaged
- Continually add ideas to this list

Academic Association and Disciplinary Society Leaders can:

- Adopt themes related to HIBAR research at all conferences
- Require that HIBAR research be included in the guidelines for society journals and is reflected in the publications accepted by the journals
- Celebrate exemplary HIBAR projects in awards, either by tuning existing awards to include HIBAR or introducing new awards
- Help lobby funding agencies to address the shortage of funding for HIBAR projects
- Arrange a professional development workshop focusing on HIBAR for graduate students
- Encourage members to support improving the ways in which research output is evaluated by signing on to the Declaration on Research Assessment (https://sfdora.org/)
- Continually add ideas to this list

Journal Leaders can:

- Publish special issues dedicated to exemplars of HIBAR
- Collaborate with multiple journals to create virtual special issues dedicated to HIBAR
- In calls for papers in regular issues, ensure that HIBAR is explicitly included
- Celebrate exemplars of HIBAR published
- Encourage discussion of impact in reviews and decision letters
- Educate reviewers about the importance of HIBAR to the field
- Highlight HIBAR in paper development workshops
- Continually add ideas to this list

University Evaluation Committee (promotion, merit, etc.) Members can:

- Evaluate the process of how the committee is formed and structured, to reduce structural barriers to HIBAR created through the selection, formation and structure of the committee
- Ensure inclusion on every committee of at least one person who is familiar with and values HIBAR research
- Ensure that documentation or guidelines about promotion and tenure expectations are made available to committee members and that the guidelines express that scholarly work focused on having impact will be recognized and valued
- Ensure that there is a specific place in the package template for information provided by the candidate where HIBAR research impact can be explicitly described
- Ensure societal impact is fully considered and valued in any decision
- Develop training to help external (or internal) reviewers provide useful and appropriate review letters regarding impact
- Adjust the valuation of publications in different outlets, to ensure that publications in HIBAR-friendly outlets are not undervalued
- Encourage departments/schools to expand the number of allowed review letters, so that candidates don't have to sacrifice a basic research review in favor of an impact review
- Continually add ideas to this list

Accreditation Organization Leaders can:

- Ensure that the requirements for accreditation include HIBAR research and societal impact
- Communicate the importance of HIBAR and societal impact through their various channels
- Continually add ideas to this list

Non-academic Partners can:

- Communicate about collaborations with academic researchers and the impact of such research
- Partner with academic researchers to jointly engage in HIBAR
- Continually add ideas to this list

Funding Agency Leaders can:

- Include an explicit section for information about the impact of the research, particularly reflecting the integration aspects described in the definition of HIBAR, in funding proposal templates and forms
- Ensure that review guidelines and rubrics appropriately value HIBAR research
- Educate reviewers to ensure that HIBAR research is recognized and understood
- Continually add ideas to this list

Individual Scholars can:

- Better articulate projects that are HIBAR in nature, to ensure that people understand the research is both scholarly and impactful
- Encourage colleagues to join the effort and consider what changes they can make in their individual role domains
- Consider dividing a HIBAR project into separate individual projects so that faculty members can get sole authorship papers if that is needed in their fields
- Continually add ideas to this list

Leaders in Associations related to Graduate Student Education can:

- Make graduate students aware of the importance of HIBAR research
- Make training about HIBAR research available to graduate students
- Continually add ideas to this list

Leaders in Faculty Associations, Unions, and Related Associations can:

- Work with university leadership to ensure that there is nothing in the statement from the university or the guidelines on promotion and tenure to preclude or discourage HIBAR research
- Communicate the importance of HIBAR and societal impact to their membership
- Continually add ideas to this list

Participants in the HIBAR Research Alliance can:

- Arrange action oriented meetings or workshops with disciplinary associations or accreditation organizations to describe HIBAR, ask their advice on what actions they could take in individual disciplines, and build commitments to take specific actions
- Offer to recognize the winners of awards presented by other organizations, if their work is HIBAR in nature
- Help to train or educate editors and reviewers about HIBAR
- Help to train promotion and tenure candidates to better articulate their HIBAR research
- Help to prepare training opportunities for senior administrators, perhaps with a module on HIBAR
- Continually add ideas to this list

Summary

This paper is intended to encourage further discussion about how the current promotion and tenure system, and academic culture more broadly, can be adapted to encourage more faculty researchers to engage in HIBAR research projects. As a starting point for these discussions, we listed some actions that could be taken by individuals and we anticipate that this list of actions will evolve as more people join the discussion and commit to making changes within their various domains. Please consider individually what you can do, and help us by both doing it and expanding this list to help others who share similar roles do the same. We welcome you to contact us at *hibar.research.alliance@ubc.ca*.

Appendix A: A brief description of HIBAR and the HIBAR Research Alliance

What is HIBAR Research?

The HIBAR Research Alliance (HRA) promotes an impactful, time-honored research style that is now called HIBAR. The term HIBAR was selected to emphasize quality while standing for Highly Integrative Basic And Responsive. HIBAR research projects succeed by *integrating* basic and responsive research *in all four of the key ways* described in Table 1:

Highly Integrative	Basic	And	Responsive
Motivations	desire for discovery	*and*	intent to solve problems
Methods	traditional investigation	*and*	creative methods
Leadership	fundamental researchers	*and*	hands-on practical partners
Time frames	long-term objective	*and*	a strong sense of urgency

Table 1. The integrated elements of HIBAR research projects

HIBAR projects comprise all eight of the elements shown in the table (perhaps not equally, but at least to a significant extent). Particularly interesting are the four shaded elements because they can be challenging to include simultaneously in a research project. There is often a "creative tension" among these eight HIBAR elements. While this might seem uncomfortable at first, through careful project design and management, the creative tension often leads to new perspectives, alternative approaches, and constructive debate. Together these elements make HIBAR projects powerfully generative.

Why is this a good time for universities to do more and better HIBAR research?

There are a number of key societal factors are affecting the evolution of university research:

- The world has many growing complex problems requiring deep research breakthroughs
- Yet the public increasingly questions the value of investing in the required basic research
- This could reduce university research funding and/or shift more of it toward shorter-term commercial efforts
- Overall, HIBAR research has decreased since the 1980s, in part because of decline in corporate research labs
- Since universities compete for top researchers and high academic rankings, faculty support for change is essential

Universities can become more responsive while remaining true to fundamental research:

- Universities can and should increase the number of HIBAR projects, from about 1 in 20 today, to about 1 in 5;
- This will require changes of incentives within the overall academic culture and, though difficult, change is possible;
- A proven method for change leadership is to organize a wide range of participants in improvement discussions;
- This requires collaboration discussions within a critical mass of researchers in a critical number of universities and fields;
- These efforts can and must resonate with the faculty culture of research excellence and academic freedom.

For these reasons the HIBAR Research Alliance (HRA) has been formed:

The Highly Integrative Basic and Responsive (HIBAR) Research Alliance (HRA) is a network that brings together contributors that share the vision of an improved research and innovation ecosystem that better contributes to solving society's critical problems. The HRA is largely decentralized, and the activities of the HRA are largely carried out by Collaborative Action Groups. These groups are currently working on (1) making academic incentive structures HIBAR-friendly, (2) encouraging creation of new HIBAR research projects, (3) partnering with related larger organizations (4) developing and disseminating better understanding and appreciation of HIBAR research.

Specifically, the Alliance aims to catalyze research collaborations which will lead to systemic improvement in the quantity and quality of HIBAR research: research that has societal impact because it combines fundamental research discoveries with their practical and effective application, and generates results that are able to be adopted often within 7 to 10 years by those in society who can benefit from them. The HRA has an established goal of catalyzing a system-wide increase in HIBAR research, from about one project in 20 today, to one in 5 by 2030, while strengthening all types of research excellence. This change will enable universities to become more responsive to the needs of society while strengthening their basic research excellence.

Explaining the eight essential elements of HIBAR research projects:

As described earlier, all successful HIBAR projects have all eight of the key characteristics as depicted in Table 1. There is often a "creative tension" among the eight HIBAR elements. While this might seem uncomfortable at first, their interaction provides a significant benefit that makes HIBAR projects powerfully generative. To help understand that, let's take a brief look at these elements, with an emphasis on their applicability over a very wide range of fields:

Integrating Motivations: Desire for Discovery and Intent to Solve Problems

There are multiple reasons that HIBAR participants strongly want their projects to succeed and they help participants to apply their very best efforts.

On the academic (or basic) side, for every problem, there is a need to *discover* both the causes and new solutions. On the responsive (or applied) side, there are problems that people wish to *solve*. These dual motivations for discovery and solution *can feel quite different*, and this can lead some to incorrectly view them as being in conflict. They are not, though. Indeed discovery and solution are often mutually-reinforcing, enabling faster cycles of invention and discovery.

As a non-technological example, consider the growing problem of income inequity. Many are motivated to solve it. This will likely require new discoveries in psychology, sociology, political science and behavioral studies and new solutions in public policy and management.

Integrating Methods: Traditional Investigation and Creative Design Approaches

Over the ages, human progress has relied on developing better ways to do things, passing these on from master to apprentice, in an endless cycle of improvement. Here we divide methods for problem solving into two broad categories, one highly disciplined (the general scientific method), and one highly creative (creative design approaches).

Again, these methods feel very different and it's true they *can* be a bit challenging to apply right at the same time. But they absolutely *can* exist in the same project, and their effectively combined capabilities are potent. For example, traditional basic research methods can help identify and understand critical barriers that appear effectively insurmountable, while creative breakthroughs can enable teams to tunnel right through them.

An example from the field of communication is the simple fact that the world doesn't have enough copper to make enough communication cable to "carry" the internet. Scientific study established that fact long ago and it remains undisputed. Fortunately, two creative leaps solved that problem – satellites and optical fibers.

Integrating Partners: Fundamental Researchers and Hands-on Practical Experts

Complex projects generally require a range of skills that are rarely available in single person, or even in a group of individuals having similar backgrounds. This has an important implication for planning the leadership of HIBAR projects. Each must be led, from conception to completion, by a team that includes at least (i) an academic expert with direct leadership experience in the research area(s) of interest and (ii) an external expert with direct leadership experience related to the problem(s) of interest. For some projects the team may need to be somewhat larger to embody all of the required expertise.

There is one slight cost in having with such diverse leadership teams. At first, due to their different backgrounds, the individuals may need to work a little harder to develop mutual trust and understanding. But the benefit from that initial effort is significant and well worth the investment.

A good example is a partnership between the US Army and an Organizational Behavior researcher at the Yale School of Management, on the topic of behavioral health care. Their discussions started an embedded research effort that led to both publications in the absolute top academic field journals and the practical incorporation of the findings on behavioral health care within all Army units, which in turn shaped the training of civilian behavioral health services providers to the Army. Without this form of partnership/leadership it is unlikely that the basic theoretical advances

and such rapid development and adoption of this aspect of improved health care would have been possible.

Integrating Time-frame: Long Term Objectives and A Strong Sense of Urgency

It is widely agreed that for most HIBAR research projects, the time interval from inception to widespread adoption of the result within society is typically at least 15 years. This requires that project leaders be committed to high energy over the long haul. It is essential that this patience does not evolve into complacency. In other words, successful HIBAR projects require a long-lasting blend of *patience with urgency*.

There are exceptions of course, but 15 years is normal and sadly those who expect faster progress are often disappointed. Consider the famous example of the development of the transistor. This was a long HIBAR story that began when William Shockley, of Bell Labs, had a temporary military managerial posting during WWII, during which he recognized that the future of communication would depend on shrinking the devices for amplifying signals. This led to his post-war collaboration with Bell Labs' director of research Mervin Kelly. They initiated a program aimed at solid state amplification – even though there was no clear idea of how to do it. Their famous invention of the "point-contact" transistor in 1947 was just one advance on their long HIBAR journey. A major breakthrough was a set of new discoveries by Shockley and his team in the 1950's that eventually made the transistor a practical reality, one that was first widely applied in the transistor radios of the early 1960's – a 20-year tale of excellence fueled by "patience with urgency."

Two examples of HIBAR research projects:

To help further clarify the definition of HIBAR research, we describe two examples of HIBAR research projects, demonstrating the diversity of possible projects within the HIBAR category. Each of these projects integrates basic and responsive research in all four of the key ways described above.

Example 1: The Scanning Tunneling Microscope

The Scanning Tunneling Microscope is a development that arose at Bell Labs Zurich in the 1980s. Its development is largely attributed to work by Drs. Gerd Binnig and Heinrich Rohrer (22), who received the Nobel Prize in Physics for this breakthrough in 1986. Remarkably, the Scanning Tunneling Microscope could have been developed decades earlier, since the underlying technologies had been understood for a long time. Yet no one had previously recognized that the well-known quantum physics phenomenon of tunneling could readily enable atomic-scale resolution of surface structure. All of a sudden, people could "see" atoms. Since then, this technology has had tremendous impact in many areas of science and technology.

Dual motivations: Binnig and Rohrer were embedded in a corporate laboratory that lived and breathed the dual motivations of HIBAR research. They wished to image atoms to understand nature better and because they sensed this could lead to solving numerous practical problems.

Dual methods: Binnig and Rohrer were very experienced at traditional scientific analysis, but their discovery required more than just that – it required a practical creative leap that was long overdue.

Dual partners: Certainly Binnig and Rohrer represent only one aspect of the HIBAR duality of participants – the research side. The other side – involvement of experts concerning problems in society – is less obvious, but according to general accounts of the culture of leading corporate labs of that era, there was regular contact with leaders who directly appreciated present and future technological problems and used that knowledge to help inspire valuable research efforts.

Dual time frame: Had Binnig and Rohrer cared only about rapidly solving an immediate problem to financially assist their company in the short term, they probably would not have developed the Scanning Tunneling Microscope – it would obviously take a long time to have its immense practical impact and might not directly help their employer. If their goal had simply been scientific research, they could have pursued other projects that had a greater chance of yielding new knowledge. From this perspective, their discovery is a perfect example of the intermediate time range addressed in HIBAR research projects.

Example 2: Microcredit

A vision and passion for applying First World ingenuity to Third World financial problems began in the readings of a Berkeley law student, Joseph Blatchford, in 1961. A combination of his thoughtful studies, and his personal experiences in travel in Latin America led to an initial plan to launch the organization Accion. This persistence and learning continued and, by 1973, it had evolved into the revolutionary concept of microcredit. This idea has provided financial credit in portions of the Third World economy that had previously been dismissed as unsuitable credit risks. Accion demonstrated an extremely high credit success rate, and slowly the idea of microcredit evolved to the major world force it is today. As an indication of impact, the 2006 Nobel Peace Prize recognized microcredit.

Dual motivations: If Blatchford had only cared about short-term successes, his work would not have carried out the basic research needed to evaluate the merit of this new approach. Thus, the blend of motivation to understand and desire to improve was key.

Dual methods: Similarly, this synergy of motivations led to the blended approach to studying the problem and taking direct action to solve it.

Dual partners: In this case, the creative drive and energy was located primarily outside of the university system and involved hands-on practitioners, but the successful acceptance of these ideas necessitated high-level participation of established researchers in the analysis of the ongoing results, which likely contributed to the impact (21).

Dual time frame: The dual time frame in this case is illustrated by 50-year time span from Blatchford's first studies to Nobel recognition for microcredit. As with other HIBAR projects, microcredit required short-term urgency with long-term patience – intense action over a long haul.

Appendix B: Related efforts for improving the academic incentive system

While this paper focuses specifically on changes needed to encourage more faculty researchers to engage in HIBAR research, it is part of a larger important conversation related to improving the academic incentive system. A number of organizations are focusing on different aspects of this improvement challenge, and many of the actions and best practices they describe are relevant to the HIBAR change effort described here.

These organizations include:

Advancing Research Impact in Society (ARIS): https://www.researchinsociety.org/

National Alliance for Broader Impacts (NABI): https://broaderimpacts.net/

San Francisco Declaration on Research Assessment (DORA): https://sfdora.org/

Research Impact Canada: http://researchimpact.ca/

Responsible Research and Innovation: https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation

Responsible Research in Business and Management Network (RRBM): https://rrbm.network/

Appendix C: Publications and other resources related to the need for improvement in the academic incentive system

The list below includes a range of publications and other resources related to the need for improvement in the academic incentive system. This is a preliminary list only and we anticipate that additional resources will be added. Many of the included references were noted in the background reading section of the San Francisco Declaration on Research Assessment website https://sfdora.org/assessingresearch/background-reading/.

Alperin, Juan P., et al. "How significant are the public dimensions of faculty work in review, promotion, and tenure documents?" https://hcommons.org/deposits/objects/hc:21016/datastreams/CONTENT/content

Association to Advance Collegiate Schools of Business International (AACSB). "Impact of research: a guide for business schools." (2012).

Benedictus, Rinze, Frank Miedema, and Mark WJ Ferguson. "Fewer numbers, better science." *Nature News* 538.7626 (2016): 453.

Dennin, Michael, et al. "Aligning practice to policies: Changing the culture to recognize and reward teaching at research universities." *CBE—Life Sciences Education* 16.4 (2017): es5.

Fitzpatrick, Kathleen. "Universities should be working for the greater good." Times Higher Education (2019).

George, G., Howard-Grenville, J., Joshi, A., & Tihanyi, L. Understanding and tackling grand challenges through management research. *Academy of Management Journal* 59.6 (2016).

Hannah, David R., Alan D. Meyer, and Marc-David L. Seidel. "Escape from Abilene: The developmental opportunity of the review process." *Journal of Management Inquiry* 27.2 (2018): 140-143.McKiernan, Erin C., et al. *Use of the Journal Impact Factor in academic review, promotion, and tenure evaluations*. No. e27638v1. PeerJ Preprints. (2019).

Nosek, Brian. "Strategy for Culture Change." (2019). https://cos.io/blog/strategy-culture-change/

Responsible Research in Business and Management (RRBM) "Vision 2030" (2018). https://rrbm.network/position-paper/executive-summary/

Schimanski, Lesley A., and Juan Pablo Alperin. "The evaluation of scholarship in academic promotion and tenure processes: Past, present, and future." F1000Research 7 (2018).

Wang, Jian, Reinhilde Veugelers, and Paula Stephan. "Bias against novelty in science: A cautionary tale for users of bibliometric indicators." *Research Policy* 46.8 (2017): 1416-1436.