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Supporting Higher Degree Research Collaboration

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Purpose: This theoretical paper demonstrates the value of a collaborative research culture framework (Gasson & Bruce, 2018a), featuring trust and respect as core elements of healthy collaborations, to support the research success of Higher Degree Research (HDR) students. Higher Degree Research is a term used in Australia to reference Doctoral and Master by Research programs.

Approach: We propose that by positioning collaboration as part of a research culture built on trust and respect, discussion about and development of healthy collaborative research culture will be facilitated. A healthy culture is defined as one that supports sustainable and productive collaborative research.

Findings: The applications of the framework demonstrate the role the framework can play in supporting researchers to understand, engage in and manage collaborations. Reflection on discussions to date has led to our view that collaborative success requires a unique set of skills (i.e., skills in the development of a collaborative research culture) and that the framework provides a deliberate and overt way of supporting development of those skills.

Originality/Value: The framework helps HDRs develop the capacity to build healthy collaborative research cultures vital for their research productivity and longer term success as researchers.

Keywords: Research Collaboration, Measurement and Evaluation, Cultural Framework

Introduction and the context

This theoretical paper argues for and introduces a collaborative research culture framework and demonstrates its application in the Higher Degree Research (HDR) context. The provision of support to HDRs in collaborative contexts is particularly important given their vulnerability (Bozeman, Gaughan, Youtie, Slade, & Rimes, 2016). The vulnerability of HDRs usually arises from their lack of research experience and early career stage. Lack of research experience leaves HDRs open to exploitation, and their stage of development leaves them more reliant on instrumental collaborations to support their career development and research capacity building (Bozeman et al., 2016). This vulnerability is heightened among female and minority groups where there are greater potential power imbalances. We propose that by making researchers aware of the importance of trust and respect in collaborative relationships they will be able to develop healthy collaborative research cultures that foster researchers and researcher development.

The collaborative research culture framework was developed through reflective discussion, about the critical elements of collaboration, between the authors as they prepared for presentations on research collaboration in different spaces (Gasson & Bruce, 2018a). These discussions were informed by literature that reports the vital role of collaboration for researchers in the current era, the complexity and diversity of collaborative arrangements and associated barriers, and the importance of trust and respect in overcoming these barriers (Bozeman et al., 2016; Bruneel, D'Este, & Salter, 2010). In the course of sharing the

framework with colleagues it became clear that by breaking collaboration down into three separate layers, each with three modes, productive discussions were possible. The framework provided the language and structure to allow researchers to understand, evaluate and articulate concerns and issues related to their collaborative aspirations and experiences. The elements of the framework provided researchers with ways to analyse what was and was not working in their collaborative strategies and arrangements, and prompted them to identify ways to build, sustain or maintain valued collaborations.

The framework's focus on process differs from the current trend in the evaluation of research that focuses solely on the measurement of outcomes (Australian Government, 2019a, 2019b). We view measurement of outcome as an indicator only of the fruits of collaboration. The framework we provide seeks to also evaluate the researchers and research organisations involved in the collaborations (the roots) and the ways that the collaborative research activity is occurring (the fields) to support management of the culture and inform performance (the fruits). The framework invites researchers to evaluate and manage the collaborative research experience rather than the assessment of its outcomes. The framework therefore assists researchers to establish productive research collaborations and evaluate their own collaborations. Such cultural and process focused evaluation supports development and maintenance of healthy collaborations and repair or closure of collaborations that are not supporting and enabling the researcher and their research.

Research collaboration has been shown to be important and relevant to the development of HDRs to ensure that they are able to contribute as researchers into the future (Australian Government, 2015; Australian Mathematical Sciences Institute, 2017; McGagh et al., 2015; Productivity Commission, 2017; Watt, 2015). Provision of suitable development opportunities continues to be discussed. It is proposed that the collaborative research culture framework could be a useful resource in the provision of suitable development opportunities. A narrative reflection on the application of the initial collaborative research framework, accounting for ensuing discussions and issues, highlights the potential role of the framework in provision of collaborative research development for HDRs.

Reflecting on the framework has led to our view that there is a need for a deliberate focus on developing HDRs' capacity to build and evaluate their collaborative research networks and communities. An understanding of the collaborative research culture framework and particularly the importance of trust and respect in any evolving collaboration is considered likely to support the HDR by fostering healthy research collaborations.

The collaborative research culture framework

The collaborative research culture framework is composed of three layers labelled the roots of collaboration, the fields of collaboration and the fruits of collaboration. The roots are shown being watered metaphorically by research leadership. Each of the three layers is in turn broken down into three modes of collaboration that illustrate differing types of engagement or activity, highlighting the complexity and potential richness of returns achievable. Implicit are the variations in returns achievable for higher levels of investment of time, resource sharing, and negotiation of formal agreements and commitment of expertise.

To inform the discussion of the framework it is provided below for reference: Insert Figure 1



**WATERING
the roots
with leadership**

**COLLABORATIVE RESEARCH
CULTURE FRAMEWORK**

SUSAN GASSON AND CHRISTINE BRUCE, V2, 2018

Figure 1 Collaborative Research Culture Framework V2
<https://researchonline.jcu.edu.au/58170/>

The Roots of Collaboration - Trust and Respect

Implicit in the framework is that trust and respect (the roots) provide enduring value throughout the collaborative experience. A sustainable and successful collaborative relationship is one where trust and respect evolves over time (Bruneel et al., 2010). In the collaborative context trust is defined as a confidence in revealing vulnerability to others and respect; a willingness listen to, acknowledge and take shared accountability for alternative perspectives and value systems. Because of this it is not possible to invest early and then ignore trust and respect; these values need to be taken into account at every step of collaboration as they continue to contribute to the overall health of the collaboration. Minimal levels of trust, to facilitate sharing, and respect are required to establish any collaboration: but a healthy collaborative research culture overtime relies on ongoing investment and attention to their maintaining and growing.

Trust and respect are cultural values that facilitate collaboration, with evidence of their impact visible across all the three fields, which are described in detail in the following section of this paper. Within the research network field, trust and respect are required by the individual researchers of themselves, in order to present and engage within the network. Within the informal research community field, trust and respect must be shown to everyone in the community by all researchers. "If you do not like, trust and respect the people with whom you work, the project will probably not reach its potential" (Stead & Harrington, 2000, p. 325). The existence of trust between the collaborative partners has been shown to result in a richer exchange of information, resources and knowledge creating a more productive research environment (Ring & Van de Ven, 1992). The sanctioned research community field is where researchers seek trust and respect from the broader community – as demonstrated by agreements signed by external bodies to fund research. Seeing how trust and respect appear in collaborative contexts aligns with the view that: "To sustain over time, the participants need to hold shared values, to understand and respect each other's personal-social identity, and to act equitably" (Seeberg & Qiang, 2012, p. 239). Trust allows the individual to be vulnerable in situations of risk and uncertainty and evolves over time based on experience of positive outcomes resulting from trusting others. Trust is vital to the sustainability and success of collaborative relationships (Bstielier, Hemmert, & Barczak, 2017). The application of trust and respect across the three fields presented in the framework highlights their significance in achieving healthy collaboration.

Trust, in order to open up capacity to share ideas and resources with collaborators, is complemented by the need to show respect for collaborators. Respect for others is based on assessment of their potential to contribute to a shared question, by bringing different but equally rigorous research skills and knowledge to the work (Davenport, Davies, & Grimes, 1999), and is therefore key to appropriate selection of collaborators. Issues of respect range from those related to the research process (i.e., respecting how long or how complex a particular task or activity is) to respect for the individual (i.e., appropriately acknowledging the contribution others make, and accepting different styles or approaches to working). Lack of respect, while it may be explained by lack of understanding or sensitivity, can lead to significant disagreements and disruption in otherwise potentially valuable collaborations (Bozeman et al., 2016). By understanding the importance of trust and respect and how they may impact the collaboration, HDRs can more readily identify when there are issues and seek to resolve them.

The first barrier created by disparate expectations is described as an 'orientation-related barrier' (Bruneel et al., 2010). While industry is looking to create a competitive advantage

through identification of research outcomes that will increase their productivity and or profitability, universities are keen to share their new discoveries to build the knowledge base and raise their profile as a research contributor in the field. The second barrier is described as a 'transaction-related barrier' (Bruneel et al., 2010). Issues that arise in this domain relate to ownership of intellectual property, use of resources and access to data. Issues of ownership and access are usually addressed within agreements negotiated by administrators operating in the industry and university domains. However, it is left to the researchers to operationalize these agreements. Critically overcoming these barriers requires the establishment of functional levels of trust and respect between research collaborators.

The key role of trust and respect (the roots) can be seen in a range of collaborations. One example that illustrates the importance of trust and respect is seen in research collaborations between industry and university. Two barriers have been described in terms of this collaboration (Bruneel et al., 2010). Both barriers are based on differing cultural expectations about how knowledge is to be used. Industry believes that they have a right to maintain their knowledge privately, while universities value and are valued because they publically share their knowledge (Dasgupta & Paul, 1994). Importantly while accommodating industry needs through enhanced project management skills, universities need to find ways to ensure that their knowledge principles are maintained (Rothaermel, Agung, & Jiang, 2007). Maintaining trust and respect between the university and industry, despite their differing views regarding knowledge and its management, is critical to collaborative success.

Orientation and transaction related barriers can occur because of differing expectations of collaborators about how knowledge is to be managed. Through shared experience, partners can negotiate ways to ensure that their differing interests are met through the collaborative process, with trust and respect being key mechanisms for lowering barriers and enhancing positive interactions between industry and university collaborators (Bruneel et al., 2010). Trust operates to open communication that facilitates problem solving and builds understanding resulting in behavior adjustments that support alignment of collaborator expectations (Bruneel et al., 2010). Without trust and respect collaborations can occur, but will involve limited sharing of ideas and infrastructure. Partners concerned that they are not understood or acknowledged will resist communication and fail to consider sufficiently what others may need to know or expect from the collaboration.

Fields of collaboration

The ability to network is important for collaborative success across all three fields. Networking has been shown to support knowledge sharing and research dissemination (Abramo, D'Angelo, & Di Costa, 2009). The capacity to network and build partnerships is important to the researcher as the number of collaborating researchers has been shown to be the strongest predictor of productivity (Lee & Bozeman, 2005) a critical indicator of research success. The fields highlight that networking is not a simple thing and allows the HDR to begin to conceptualise how they may network now and into the future within each field. Fields are separated to support conceptualization and discussion, however it is understood that they are not in reality discrete and separate. Researchers may operate across these fields differently depending on the strength of their networks, the nature of their discipline and research and their experience and expectations. The fields provide a jumping off point for HDRs to consider the type of networks they could engage in, how these may develop and what they involve.

The simplest mode of networking proposed in the framework is represented in the first field, the informal network, which involves the individual researcher acting to build their level of research engagement. Individuals operating at this level may be looking for feedback on their

research to date by attending a conference and delivering a paper, or they may be attending a workshop to learn from the expertise of a key researcher working in the area. Networking is a specific skill and requires attention to the people and places engaging in research related activities of interest to the individual. So networking requires not just meeting people, but meeting relevant researchers in appropriate contexts. Such contexts will allow access and engagement. The researcher needs to be proactive and think about why they are attending and how best to benefit from that opportunity. For example a simple strategy for a new researcher looking to build their research contacts through attending a conference is to ensure they have a strategy for sharing their contact information and research profile webpage such as business cards. Such information should include their latest contact details and links to their research publications via ORCID, LinkedIn or similar systems. Exchanging contact information with others will open up opportunities to share ideas and provide a way forward for future follow up and discussion.

The second field of collaboration is the informal research community where a group of researchers meet together regularly to share work and ideas. Such communities may include informal gatherings of researchers in the coffee shop during a routine work break or planned gatherings of all the students supervised by a particular researcher or student interest groups built around a common interest in writing (e.g., Shut up and Write groups, writing retreats or workshops etc.). Many HDR students report the isolation of their PhD journey. This field could be used to prompt them to consider their specific objectives or research interests and how collaborations could be used to advance their desired outcomes. The framework also helps them to recognize when they are being invited into a group to ensure they understand and appropriately evaluate and manage their engagement. For example, they may be invited to co-author a publication or grant application. They need to consider if they have the time for such activities and how opportunities align with their research priorities, expertise and interests.

The third field of collaboration is the sanctioned research community where the interaction and engagement is informed by a contract or agreement. Such agreement may be used to support, for example, the provision of funding or the dissemination of outcomes. The creation of an agreement requires negotiation that may involve expert staff beyond the research team who may provide legal, policy or financial advice. Agreements may articulate expectations and requirements in relation to the sharing of resources and potential delivery of research outputs. More experienced researchers with knowledge of how to develop such arrangements can support HDRs who wish to be active in this field. The researcher needs to evaluate the benefits against the cost in time and resources involved in setting up formal arrangements. Benefits may include financial advantage such as provision of grant or scholarship funding or enhancement to the profile of the researcher and their home institution. Other considerations may relate to how realistic the arrangement is in terms of the time and resources required, and the capacity of the research collaborators to generate the anticipated outputs. The third field again provides a jumping off point for discussion, this time in relation to engagement in a sanctioned research activity now or into the future.

Fruits of collaboration

The fruits of collaboration include innovation, inspiration and inclusion. Innovation, inspiration and inclusion may occur synchronously, emerging in response to the requirements of the research and the capacity of the researchers, and can be encouraged by factors such as access to knowledge management tools and expertise (Ceballos, Fangmeyer, Galeano, Juarez, & Cantu-Ortiz, 2017). The quality and quantity of innovation, inspiration and inclusion reflects, and facilitates, the sustainability of the collaborative research culture. Strategies for

measuring research productivity, while valid and relevant, do not necessarily support evaluation of the health of a collaborative research culture. The capacity to realise fruits relies on shared understandings between the collaborators about the objectives of their work and their outcomes. These shared understandings cannot be assumed, particularly in terms of the value placed on knowledge (Bruneel et al., 2010). For example, for researchers their position and prestige in the research world relies on the capacity to disseminate their research outcomes widely in quality journals, while for the industry partner the value of new innovation is to exploit it privately to gain advantage for their organisation over their competitors (Dasgupta & Paul, 1994). As a result industry favours private innovation while universities favour inclusive knowledge sharing where the benefits of findings can have the highest impact possible by serving the public good as broadly as possible.

Authorship across collaborators and disciplines can also be complex to manage and can impact on the capacity of a group of collaborators to demonstrate inclusion of each other in their work. Disciplinary norms regarding authorship and publication vary and need to be accounted for and negotiated with care (Bozeman et al., 2016). For example, places of publication vary between disciplines some favouring quality journals and others conferences or even books. Another common concern in relation to authorship is recognition of contribution. In some disciplines first author is the primary author while in others authorship is determined alphabetically. Trust and respect among collaborators can be instrumental in ensuring that authorship is appropriately acknowledged. The metric approach assumes that authorship accurately reflects the source of the outputs, and does not account for how research collaborators may have worked together to realize the output (Bozeman et al., 2016). Differing approaches to work, or differing expectations of research outcomes in light of stage of career, can also impact willingness and interest of collaborators to include others when working to develop outputs (Bozeman et al., 2016). The framework can be used to assist HDRs to reflect on their experiences as researchers and understand more fully what is involved in realising healthy collaborations.

Research Leadership

The final dimension of collaboration relates to research leadership. There is recognition that collaboration requires good management (Bozeman et al., 2016). Leaders can play a critical role in establishing management practices and in building successful collaborative groups. Research leaders tend to be involved, if not instrumental, in the initiation and development of collaborative research cultures within their groups and centres. Key leadership roles include approving, if not establishing, most aspects of collaboration (i.e., managing budgets, authorizing access, approving travel, as well as, supervising and mentoring researchers) (Travaille & Hendriks, 2010). A leader can play a critical role in developing a culture of collaboration by modelling suitable collaborative researcher practices. Suitable researcher practices are those that champion research policy and process and that support the development of trust and respect within and beyond the disciplinary team (López-yáñez & Altopiedi, 2015). Because research leadership has such potentially broad ranging influence over research collaboration it is shown in the framework watering the roots of collaboration. The presence of research leadership in the framework is intended to prompt discussion about leaders and leadership styles when used in interaction with HDRs.

Reflections on application of the framework

In moving the discussion into the HDR context our intention is to demonstrate its potential to support students and their supervisory teams to respond optimally to the call for increased collaboration/end-user engagement. The application of the collaborative research culture framework in the HDR context allows collaborative research professional development to go

beyond subjective evaluation of its outcomes (i.e., measuring and reporting on the impact and outcomes of collaboration) to understanding and evaluation of the process (i.e., the underpinning culture required to establish and manage a healthy collaborative research culture).

An example of the role taken by a supervisor is provided to illustrate their potential pivotal role in application of the framework in supporting an HDR. Building a collaborative research culture could involve the supervisor deliberately illustrating how to use the framework and modelling different collaborative practices (e.g., facilitating professional development relating to collaboration for HDRs). As HDRs start to collaborate the supervisor could use the framework to reflect on the roots, fields and fruits of the collaboration. Supervisors may wish to share ideas about how to enhance the collaboration in keeping with the HDRs' capacity and stage of candidature (e.g., the supervisor may co-author a paper with the HDR based on their work together to date). To help the HDR to sustain the collaboration the supervisor could reflect with the HDR on the networks and resources available to them and explore the potential impacts of collaboration for them at their particular point in candidature. This may involve a discussion of how trust and respect with collaborators has been progressing, and look to troubleshoot any issues (e.g., checking that the HDR is a named author on any proposed papers). As required the supervisor may highlight how an existing collaboration has enabled research outcomes that would have been beyond the capacity of the individual operating alone (e.g., the supervisor can celebrate with the HDR their success in accessing data from a research partner or getting access to grant funds to support their research activities).

To illustrate the complexity of discussion that could evolve from the framework it should be noted that HDR students could be operating in all three fields simultaneously. As a result the supervisor may need to explain to the HDR that success or failure in one field could impact capacity to collaborate in another. The HDRs could, for example, be co-authoring a publication, while attending a seminar to improve their writing skills. They could be conducting collaborative research as an outcome of a successful grant. If they plagiarise in a sole authored work and are found out by their co-authors in a separate work they may stop being able to collaborate or, in the worst case, even research. The example presented would allow the supervisor to highlight the interdependencies between the fields of collaboration and the critical role of trust and respect for their research practice.

The framework (Gasson & Bruce, 2017) has been presented in university-wide workshops, a seminar and two international conferences. The ease with which the framework was understood by differing stakeholders (e.g., students, supervisors, research leaders, research administrators) assured the authors of the flexibility and relevance of the framework. Within minutes of sharing the framework participants were using the language of roots, fields and fruits to discuss differing collaborative situations and concerns. The ease with which these terms allowed them to describe issues and for the group to discuss them demonstrated the value of the framework for problem solving and troubleshooting collaborative challenges and highlighting successes.

One application of the framework was in the context of a university-wide series of workshops for early career researchers, students and supervisors, as well as research leaders. The aim of the workshops was to assist researchers to focus on building collaborative research cultures. The framework provided a foundation for discussion, personal and group reflection and action formation across each group. Resources were developed to allow workshop participants to reflect on their understanding of collaboration and to consider the field/s that they were ready to move into and engage in (Bruce & Gasson, 2017). Reflection included

consideration of fruits that researchers were seeking and the actions involved in entering or transitioning between fields.

At one international research administrator conference, during the 90 minute session, participants were introduced to the framework as a way of supporting discussion about three collaborative research case studies (Nordahl, Blom, & Gasson, 2017). At another international conference participants were introduced to the framework and invited to discuss its possible application within the HDR context (Gasson & Bruce, 2018b). In both cases the discussion reflected clear understanding of the value of collaboration, with interest expressed in how the framework facilitated explaining or responding to issues associated with particular types, elements or instances of collaboration.

A further application of the framework involved providing professional development and support to help HDRs create and operate in healthy collaborative research cultures. One preliminary seminar was held in this context. The proposed application of the framework was to assist research leaders and other key stakeholders to consider how best to create a research development culture supportive of collaborative skills building among HDRs. Discussion in this case focused primarily on how best to create collaborative engagement opportunities for HDRs. Based on a brief introduction to the framework participants in discussion understood the value of the framework in explaining diverse collaborative opportunities, its many different forms and impacts, and strategies for collaborative engagement. Participants expressed an intention to use the framework to inform their future collaborative training activities.

Reflecting with participants on how the framework informs their collaborative experiences has in all cases shown itself to be a successful strategy in building understanding and appreciation of the value, nature and forms of collaboration. Participants, particularly in the workshops, were able to frame questions relating to challenges to research collaboration, and to frame questions about how to sustain or establish new collaborations. Respect and trust continued to provide a key thread in illustrating where collaborations were failing or partners not engaging. It is suggested that a reflective process involving reference to the framework would be effective in engaging HDRs in professional development activities to build their understanding and appreciation of collaboration and as a result their collaborative capacity. In all contexts the framework was used to highlight trust and respect as essential in building healthy collaborative research cultures.

Questions arising

Some questions arising from our experience to date are raised for consideration. It is our contention that these also may be reflected on with reference to the key role of trust and respect illustrated in the framework:

- What are the characteristics of a healthy collaborative research culture?
- What puts a healthy collaborative research culture in place?
- What puts a healthy collaborative research culture at risk?
- How is a healthy collaborative research culture measured and maintained?
- What is the role of research leaders in building, maintaining and sustaining collaborative research cultures?

Conclusion including limitations and future work

The cultural framework (i.e., the roots, fields and fruits of collaboration) focuses attention on the importance of trust and respect for forming healthy research collaborative cultures. The framework has assisted individuals and groups to discuss and learn from their collaborative experiences, and supported better understanding of collaborative processes. The roots

represent the critical factors for successful collaboration - trust and respect; these are the shared values at the heart of the collaborative research culture. Understanding the role of trust and respect supports HDRs wishing to form and engage in healthy (sustainable and productive) collaborative research cultures. Each of the three fields of collaboration refers to a distinct and different collaborative community. While activities in different fields can occur simultaneously, success or failure in one field can influence activities in other fields. Being aware of the range of tangible and intangible outcomes, as illustrated by the fruits of collaboration, including inspiration, inclusion, innovation, provides a way to understand what a successful collaboration culture can achieve. The fruits can be used to evaluate the collaboration process. Evaluation of the collaborative process, complemented by the metric - based evaluation of outputs, can be used to provide a more complete picture of the impact of collaboration.

Further work is needed to determine how best to build collaborative research cultures, and to evidence and document the impact of the collaboration process. The current framework and discussion focuses on the importance of research collaborations for HDRs and the key role of trust and respect in building a healthy collaborative research culture. The framework is available for anyone to use in professional development activities or other discussions aimed at supporting understanding and formation of healthy collaborative research cultures.

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Field Code Changed

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