

Developing a Workforce to Support Research Reliant on Data and Compute

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Abstract. We describe the construction, operation and evaluation of the Melbourne Data Analytics Platform; a group of academics whose mission is to support research requiring non-trivial data analysis or compute at the University of Melbourne.

Keywords: Data analysis, Research support, Evaluation

1 Introduction

Like many organisations, the University of Melbourne recognised many years ago that digital methods for generating, analysing and storing data would be fundamental to the business, teaching and research activities of the university. Our comprehensive university is composed of ten faculties that include Law and Fine Arts through to Science and Medicine, and it was envisaged that each faculty would require some support, possibly at different levels of complexity, for research methods that relied on computing and data. Such recognition led to the formal establishment of the Petascale Campus Initiative in 2018 within the university. The Initiative had the triple aim of increasing affordable access to computer hardware for research; building infrastructure, policies, processes and procedures for supporting research data management; and developing a sustainable workforce to assist researchers. The aim of this paper is to describe the process that we used for the formation of the workforce, which has successfully operated for about three years under the name Melbourne Data Analytics Platform.

2 Context

While the idea of “Big Data Enabled Transformations” may well be considered little more than a myth propagated by large tech companies to increase profits [7], the promise of transformation has certainly captured the imagination of many organisations. The reader can no doubt bring to mind several examples, and has probably experienced some first hand. While our university is no different in some regards¹, our efforts to establish a support workforce for research in the areas of data and compute have been considered.

¹ For example, establishing a “business intelligence” unit to harvest insights from student enrolment, finance, and other data

Wang and colleagues [11] identify key links between the transformative power of big data capabilities, practices and benefits concluding that “a focus on strategic view has great potential to help balance the number of studies of big data from technological and managerial perspectives (p. 74)”. Such potential is echoed other studies of large organisations [3, 9] as scholars suggest that too much focus on either techno-optimism (seeing big data and AI as a panacea) or policy pessimism (disregarding big data and AI in light of entrenched practices) can undermine balanced research [10]. In practice, therefore, when developing a research support workforce we must be wary of these two extremes and remained focused on the intended outcomes the workforce should achieve.

The focus of modern academic research endeavours is to have “impact”. In an Australian context, this is defined by the Australian Research Council [2] as “the contribution that research makes to the economy, society, environment or culture, beyond the contribution to academic research.” While impact evaluation has a long history (see Gertler et. al [5] and references therein), academic institutions are still coming to terms with how to best evaluate the “impact” of academic research. As we are looking to establish and sustain a workforce that supports research rather than lead independent research, we can finesse this issue by being aware that the researchers we support will be seeking impact, but it is up to them to define and evaluate the success of their own research. Success of our workforce, therefore, is reliant on the researchers we support succeeding by whatever metrics they choose.

3 A Basis for Hiring

As the workforce we were building at Melbourne was new, we needed a deal of flexibility and agility in recruiting, setting operational structures in place, and evaluating outcomes. It is tempting in such an environment to operate as a “disruptor” and claim special status within the organisation, relying on governance to be wilfully ignorant of the new “tech startup”. But Whitchurch and Gordon [13] warn that fluid projects relying on professional networks and relationships run the risk of ignoring formal structures that enforce transparency and equity. Similarly, Klein [6] advocates for central oversight and management, but not “monolithic control”. Rather than deliberately subvert university processes we opted to make use of a “work focus” category in the HR policies of the university.

Existing at the university are two formal categories of employees: Academic and Professional staff. Academics are responsible for undertaking teaching and research, while Professional staff provide supporting infrastructure such as finance, HR, legal compliance, student record keeping and so on. There is a sub-category (or “work focus”) of Academic called the Academic Specialist which allows for an Academic to focus on one particular activity; for example, teaching. With this point in mind, we adopted the option to create “Research Data Specialists” to make a team of academics who were focused on supporting research using digital methods.

In our initial analysis, the category fit nicely with Whitchurch’s definition of a “third space” of employee that sat between the Academic and Professional categorisations [12]. The term third space, originally borrowed from cultural studies, embraces the notion that our workforce will require both in-depth academic training and collegial support. Neither a traditional academic nor solely a professional member of staff, the “third spacer” can only be fully recognised through an emerging set of new concepts. Eventually, we came to understand the work of Whitchurch as primarily concerned with Professional staff transitioning to work that demanded a deep understanding of academic research. By choosing to make use of the Academic Specialists focus at our university, we were more concerned with academics who would be asked to take on some duties more akin to Professional staff.

We came to adopt a more powerful narrative that is grounded in the concept of interdisciplinarity [6]; not only between academic disciplines, but between the two major workforce cultures that exist within the institution. Repko and Szostak [1] define interdisciplinary work as being in a contested space between the cultures associated with particular disciplines. Of particular note, they argue the term “interdisciplinary” is preferred for university and related research settings because it evokes a sense of critical thinking that is often needed to evoke key questions that eventually lead to the production of new knowledge.

Table 1 (adapted from Repko [1]) lists traits of an interdisciplinarian that we saw as being key to people we employed into the workforce. While it is unlikely that we can ever find individuals that have all of these traits, the list does provide a framework for hiring decisions and ongoing development of our workforce. Of note, our experiences pointed to a love of learning, tolerance of ambiguity and an appreciation of diversity as the most important traits. Following soon after those three, openness and adequacy are also key to successful team building.

These key traits also fit with the observations by Palmer and Neumann [8] who note that humanities scholars who undertake interdisciplinary research can be grouped into two behaviours: “exploration” or “translation”. In our case, the “exploration” of new fields is dictated by the researchers that we support, and so we need staff who are “translators”. In particular, the processes and activities that these staff will undertake are learning, contextualising and converting information [8].

4 Establishing the Workforce

With a framework in mind for the types of employees we wanted, and the style of operation we wanted to encourage, we chose to hire in two phases. The first was an internal recruitment round, figuring that existing employees of the university would have their own networks of researchers that they could easily support as a first round of activities and that they would have existing knowledge and social support for navigating university systems and processes. Once this group was established, we would augment them with an hiring round open to both internal and external applicants.

Table 1. Traits of an interdisciplinarian [1].

Traits	Key concepts
Enterprise	Willingness to assume risk to achieve outcomes
Love of learning	Enthusiasm for learning in new situations in ways that are novel, adaptable and pertinent to the problems ahead
Reflection	Evaluation of conflicting lines of information, controversial stances that leads to an ability justify important decisions
Tolerance for ambiguity and paradox amid complexity	Acceptance of understanding as a constant process that may never be complete, and an attitude to remain open to new information and processes
Receptivity of other disciplines and their perspectives	Openness to a range of disciplinary perspectives, and a willingness to work with those embedded in disciplinary ways of thinking
Willingness to achieve ‘adequacy’ in multiple disciplines	Appreciating the difference between achieving an adequate understanding at the expense of mastery of a discipline area
Appreciation of diversity	Respect for people holding differing views, and an awareness of own biases, as problems and solutions emerge
Willingness to work with others	Collaborative approaches and thinking that manifest through intellectual, interpersonal and group communication skills
Humility	A learned state of mind that leads to further learning and greater respect of experts and others

The initial group was afforded a large degree of autonomy to build their own internal structures processes and operational principles. The motivation for this was twofold. Firstly to reinforce that the employees were Academic Specialists, and thus had freedom within the confines of university policy and strategy to choose what they worked on and how they worked. This was supported by the university’s academic promotion processes which call for an argued case for each individual, and does not set arbitrary numeric targets and goals that must be met. Secondly, in order to attract top software engineers and data scientists from industry the university cannot compete on salary, but can compete by offering academic freedom and flexibility in the workplace. We want the team to be an energetic, supportive and intellectually stimulating environment to attract top talent.

In keeping with the idea of an argued case for academic promotion, we set boundaries for the workforce in the style of “claims” for which they could argue as being met. These claims are outlined in Table 2. Every six months, leadership of the group gathers evidence and assesses if each claim is weak, moderate or strong using a mix of qualitative and quantitative methods.

Table 2. Claims that can be made if the workforce is successful. Measured on a scale of Weak, Moderate, and Strong.

Claim	Description
Support	Specialist staff actively advise, support and develop researchers through the continuing improvement of foundational platforms and services for data intensive research.
Communities	Specialist staff work collaboratively and proactively with staff across the whole university to strengthen sustainable communities of practice in ways that are informed by evidence.
Visibility	Specialist staff are visible and recognised as valued participants in data intensive research both within and external to the university.

5 Ongoing Operations

As Freeth and Vilsmaier [4] argue, studies that detail the “lived experience of navigating” interdisciplinary research projects are rare. Despite the promise of working across and within disciplines, practitioners must balance the oft-conflicting differences of such work that teeter between observation versus participation, curiosity and care, and impartiality versus investment. Further to these tensions that require balancing, the ongoing operation of our platform²

² “the network of interactions and synergies becomes the platform, not simply the hardware structures and software strategies that facilitate them.” [6, p.67]

has its own characteristics that require balancing as outlined in Table 3. An important part of our workforce development is learning to acknowledge and accept of these tensions as an inevitable part of a complex working environment [4]. This agility in working practice and goal setting is also essential in the leadership and management of the workforce [6].

Table 3. Balancing acts that need constant calibration during the operation of the Platform.

Label	Point	Counterpoint
Work style	Transactional services such as data wrangling and cleaning must be performed for researchers to lift their ability to make use of more complex methods.	The Platform must offer an academic style of working in order to attract excellent staff on a university pay scale.
Training	There are many researchers who would benefit from introductory courses on basic tools, concepts and methods.	Delivery of training (as opposed to education) is not an academic activity. Steering researchers towards well constructed self-learning resources is preferred.
Profile	The Platform is a support activity, therefore should not have a high profile and should not overshadow the researchers it is trying to support. It should not be a “brand”.	Platform staff are highly motivated academics who want recognition and a vibrant community of practice. Further, internal funding is reliant on the Platform having a strong reputation within the University.

In summary, meeting the demands of creating a competent workforce that can meet the growing demands of data intensive research depends on creating a strong framework. We found success in constructing our perspective on an argument-based approach that was grounded in the widely used promotion and performance criteria as we sought to identify and enhance the traits of an interdisciplinary team. Perhaps counter-intuitively, the team was given latitude to then create their own methods of working together rather than, for example, senior academics imposing their own disciplinary views of “how things should be done”. We ourselves were fortunate that the University allowed us the freedom to craft a response to a complex environment that now avoids the pitfalls of having tightly coupled SMART goals to defined projects that can no longer be defended in contemporary institutional setting characterised by fast-paced, interdisciplinary research.

Importantly, however, it is worth noting that our experiences remain uncommon; that is, we see that the University as a whole will require a long period of adjustment to create new frames on how it seeks to manage, stimulate and re-

tain a workforce capable of working across disciplines in data intensive research. Eventually, senior leadership will need to consider new approaches that, indeed, must foster success in the competitive global environment.

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