Using Iterative Persona Development to Support Inclusive Research and Assessment

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ABSTRACT

This research paper confirms the value of methodological work and describes our approach to building personas for iterative assessment, beginning from question formation and proceeding through data collection and analysis to follow-up. We discuss how our approach can help teams evaluate both day-to-day work and progress toward long-term goals. We highlight how iteration is an important driver for this method of internal assessment, the overarching framework of "Constructive Distributed Work" (CDW) it seeks to bolster, and our goal of advancing research about ethical collaboration. Readers can adopt our method to their own teams, making adjustments to accommodate their own ethical goals, motivating our use of personas and/or the CDW framework itself.

CCS CONCEPTS

• **Social and professional topics** → Professional topics; Management of computing and information systems; Project and people management; • **Applied computing** → Education; • **Software and its engineering** → Software creation and management; Collaboration in software development; Programming teams.

KEYWORDS

Methodology, assessment, personas, collaboration, distributed work, research teams

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1 INTRODUCTION: MAKING DISTRIBUTED ACADEMIC WORK CONSTRUCTIVE

Over the last six years, our research team has designed and launched Crow, the Corpus and Repository of Writing—a digital platform that integrates a corpus of student writing and a repository for teaching materials. This platform is designed to foster collaboration and expand inclusive writing instruction through corpus research and pedagogy. Our interdisciplinary team includes researchers from nine institutions with specialties in applied linguistics, second language studies, writing program administration, data science and technical communication. We are focused on stewardship of the tools we have built and we are further committed to fostering a healthy and sustainable work environment for faculty and students. Inclusive, ethical practices for mentorship and collaboration are central to the Crow mission. In other words, how we work is as important as what we make.

Our approach to managing this complex project is called Constructive Distributed Work (CDW). Using the CDW heuristic, we take a three-dimensional approach to project management that allows us to think iteratively about our core principles, best practices and orientations to work. Because all the aspects of CDW are networked, using a heuristic allows us to amplify effective strategies while remaining accountable for potential gaps or complications in our work. Each element of the CDW heuristic is defined here. For a more detailed description of this heuristic approach, including examples specific to our context, see [16].

- **Core principles** (networked mentoring, rhetorical confidence, and sustainable infrastructure) underpin every aspect of Crow research and development, and guide our decision making processes.
- **Best practices** are the documented procedures, including onboarding and training, that define how we go about day-to-day work.
- **Orientations to work** (Approaches, Activities, and Outcomes) include our methodological frames, daily tasks, and measured results that allow us to accomplish our goals.

Because we are a diverse team, distributed across an international network of institutions, coordination and collaboration through digital tools [25, 35] lives at the heart of our project. Knowledge work requires continual attention to the ways we work together in both digital and physical spaces [14, 32]. Infrastructure grounded

in technical communication principles allow us to sustain multiple research sites and development tasks across multiple contexts. We are also attuned to the ways that digital collaboration can make labor and intellectual accomplishment invisible, and lead to feelings of fragmented identity from researchers, especially students and junior scholars [10, 24]. Researchers from historically marginalized groups, international, and first generation scholars can further feel alienated or excluded when best practices don't support them effectively. As primary investigators and administrators, we are responsible for building research and development spaces that are inclusive, ethical, and reciprocal. Crow work over the last six years has demonstrated the success of CDW for building more equitable and accessible research spaces. Undergraduate and graduate students who have worked on Crow have developed successful tools for research, published consistently, secured grants and fellowships, and are building successful careers inside and outside of academia. Our current goals are focused on outreach to historically marginalized scholars to support pedagogical and professional development. These ambitious goals require continued assessment and iteration as our objectives, researchers, and site contexts evolve.

Our initial goals for Crow focused on the sustainability of the corpus and repository as a software platform even when faculty and student researchers shift priorities, move across institutions, or graduate. As we have grown from a group of eight researchers at one institution to more than twenty researchers and nine sites, including three international locations, we are celebrating the success of current and former Crowbirds. We also experience the complications of expanding to include junior faculty at new universities, and we continue to uncover and address our own shortcomings when it comes to building work patterns and relationships that support all our team members. The experiences of Crow researchers, coupled with evaluation of how our best practices are enacted through every day work, can help us to understand where we need to improve. We hope to develop tools other research teams can use to assess their own practices and better respond to the needs of researchers and participants.

This article outlines the methods we are developing for ongoing assessment and iterative response to the needs of our team. Cushman [8] and Walton et al. [41] have described the value of making one's project or program a research site—that is, using our expertise to self-evaluate, and sharing the results of that evaluation with others through scholarship. Our commitment to data-driven reflection and transparency must also take into account the sensitivity of engaging colleagues, both faculty and students, as research participants. The methods we share here are focused on developing effective assessments that are also supportive of researchers, their privacy, and their contribution to our learning process. Drawing on user experience to develop data-informed personas is, we think, an effective way to transparently evaluate our practices while protecting the researchers who inform that evaluation. Sharing these methods as we develop them highlights a central tenet of Crow practice—share your work early and often—and helps us to build reflexive and reciprocal feedback loops that are valuable to our team, and to the field, as we think about how to actively address the complex problems students and researchers face. By articulating these problems early on and through continuous assessment, we are engaging team members in the research process and in problem solving that becomes necessary when gaps and barriers are identified.

We describe the value of methodological work for research teams, then outline our approach to building personas for iterative assessment in detail, beginning from question formation and proceeding through data collection and analysis to follow-up. We discuss how our approach can help teams evaluate both day-to-day work and progress towards long-term goals. We highlight how iteration is an important driver for this method of internal assessment, the overarching framework of constructive distributed work it seeks to bolster, and our goal of advancing research about ethical collaboration. Readers will be able to adopt our methods to their own teams, making adjustments to accommodate their own ethical goals, motivating our use of personas and/or the CDW heuristic itself.

2 PRIORITIZING INCLUSION THROUGH METHODS

In this section, we make the case for the intrinsic value of methodological research, showing how it can be a driver for the goal of attending to social justice through technical communication. We discuss the role that tacit knowledge plays in this research, highlighting the importance of that knowledge and noting that it can be lost without a robust commitment to transparency. A genuine commitment to iteration can help preserve transparency in methodological research, though this is difficult. For research teams, the literature of program assessment can help to preserve iteration (in the feedback loop of successful long-term assessment) and by making social justice a priority. We conclude by documenting the sources we draw on for building personas in a manner consistent with these goals.

2.1 Methodological Work Requires Particularity and Detail

Our engagement with methodology arises not only from our recognition of its intrinsic value, particularly for the sociocultural approaches we often use [17] but because recent scholarship in technical communication suggests its necessity. The social justice turn in our field [1, 42] will have limited effectiveness if it is not reflected in the methodology that supports empirical research and instruction. Inspired by Smagorinsky's call to make the method section "the conceptual epicenter of a manuscript" [36, p. 390], we focus on our methods of persona development as results for the purpose of explicit reporting on the conduct of research. Smagorinsky also argues that particularity is a "worthy aim of research" (p. 394) because it allows readers to understand how researchers render data into results. As he points out, this is a matter of social justice: describing contexts in depth, including culture, race, gender, privilege, and other demographic characteristics not only makes it possible for people outside these contexts to understand and benefit from scholarship, but identifies contexts where more attention to social justice is needed.

To enhance the credibility of qualitative research, detailed descriptions of methodology encourage replicable, aggregable, and data-driven research [31]. In designing our research methods for

assessment, we borrow from software development and user experience design [11, 43] to build reflective personas which help us evaluate how we do things in Crow without limiting our assessment to the quality of what we make. Thus, a thick description of methodology also enhances the validity of our approach to assessment. Like Scott & Melonçon [34], we see extensive engagement with methodology as "self-reflexive forms of engagement" that can highlight the rhetorical nature of methodology and make it a valuable tool for self-criticism. Such reflection is generative, creating "some kind of positive action through a rhetorical practice" [39 p. 13].

The work of examining our collaborations to ensure the day-to-day activities of Crow benefits our team members on the long term by drawing out the tacit knowledge that shapes decision-making. As Moore & Elliott show [18], participatory design has the potential to illuminate the tacit knowledge of relevant participants and raise its profile in design processes. But the difficulty of identifying this tacit knowledge is well-known, especially for contexts like ours that involve the development of academic identities [27]. This is one of the reasons we've used interviews for these internal assessments, especially discourse-based interviews involving both internal and public-facing documents produced by the Crow team [22]. In these interviews, participants' rationales for rhetorical choices are the focus of inquiry, as researchers identify possible writing choices and ask participants if such choices are viable in specific contexts.

2.2 Methodology Can Advance Transparency

As Moore & Elliott also explain [18], not only is the discovery of tacit knowledge challenging, but its value can be reduced in data gathering if data collection and reduction disconnect it from context. In the examples they provide, planners' well-intended directions to create a data set useful for the next step of planning a community space made it impossible to identify particular contributions and the issues participants identified as related to them. For participatory processes, this can make it difficult or impossible for the citizens involved to review the data being gathered and point out where it fails to represent "important concerns, stories or knowledge that might have gotten lost" [18, p. 69]. That is, data collection and reduction become black boxes that not only disconnect relevant contexts but make the specific mechanisms that do so inaccessible to participants. As a result, regardless of the level of transparency present at other stages of the process, overall, the voices of those speaking are muted. To most accurately and completely represent both tacit and explicit knowledge, researchers must seek a commitment to transparency at every stage of the process, creating a "listening infrastructure" that not only gathers tacit knowledge but ensures access to the mechanisms for integrating it into more easily gathered and traced explicit knowledge.

Actively engaging in software development and adapting design thinking processes to shape grant writing and other Crow activities has helped our project in many ways. Technical communication often draws on these frameworks, which encourage problem-solving through an iterative process of articulating problems, then attempting to address them, by working closely with the people deeply engaged in the problem contexts. While specifics vary, the five-step model of "empathize, define, ideate, prototype, and test" is very popular [26]. We've adapted design thinking for the Crow team and created internal documentation that suggests its usefulness for writing research [9].

But much like Moore & Elliott [18] describe for participatory design, design thinking frameworks can reduce transparency in unintended ways. The introduction of the conceptual framework of design thinking to academic contexts where it is not already present requires that we teach the skills and habits of mind necessary to take it up, making time to explain design thinking fully to students and colleagues, and being transparent about our expectations [13]. Failure to do so can result in a bifurcation between expert researcher-designers and novice participants reminiscent of the "hero designer" role [37]. Instead, drawing on the sources we've already mentioned, we should build infrastructure that actively discourages the deficit model arising from "expert" or "hero" positioning. Greenwood et al. [13] describe such infrastructure as "critical-rhetorical-methodological," suggesting how attention to making methodology transparent can advance our critical and rhetorical goals. For example, onboarding new researchers with the Crow user experience primer cited earlier [9] serves that purpose.

2.3 Methodological Inquiry Must Be Iterative and Recursive

When the Crow project was in its infancy, we identified lack of attention to user needs as a key problem in the design of web applications for writing research by making an inventory of popular corpora whose impact was undermined by disappointing user experience. We made a commitment to designing highly usable and accessible software based on feedback from user communities, and recognized we should carry the same approach into team building by foregrounding the needs, experiences, and goals of student researchers, not faculty PIs, and imagining our research as community, not hierarchy. Again, this suggested the methodology of design thinking, and in particular its insistence on iteration and recursion: the assumption that our attention to solving complex problems never moves smoothly from start to finish. Rather, as contexts change, and problems shift, we have to repeat the stages of the design process to re-empathize with user communities, to re-define problems, and re-imagine and re-test possible solutions.

Not surprisingly, this is challenging, especially given the ways linear writing processes and/or fixed-length time frames are reinforced in academic contexts. This is apparent in the work of rhetorical scholars who led the way in introducing design thinking to writing studies: Arola emphasizes the need for encouraging creativity and flexibility [2]; Purdy focuses on establishing parallels between design thinking and rhetoric [28]. Both are extremely important, essential ways to help teacher-scholars writing gain relevant design expertise. But without the iteration and recursion at the heart of design thinking, it will be limited in impact—or worse, counter-productive.

The need for an iterative approach to methodology is underscored by the need to break down the black boxes that appear and fade away in networked communities. If black boxes are undone only to be redone by networks [38], those who wish to understand how networked systems operate must counter that with purposeful iteration—an approach identified as "unblackboxing." [5]. As

Atherton argues in these proceedings [3], technical communicators have an ethical responsibility to make visible the rhetorical and material consequences of the systems that fade into the infrastructure of successful systems. The iterative methods we share here are one way we interrogate the blackboxes that develop in the project management of ongoing research projects.

Sometimes the iteration and recursion at the heart of design thinking is identified as "messiness:" the purposeful flimsiness of paper prototypes, the deliberate speed of discount usability, the seeming chaos of trying new ideas, etc. This is, in fact, its virtue, one shared by attention to methodology in general [33, 39]. Indeed, reframing so-called messiness as necessary complexity delivers tangible benefits erased if we "clean up" our processes, maintaining linearity rather than repeating and evolving to keep pace with change over time [13, 18].

2.4 Methodology Can Make Assessment More Inclusive

Iteration is a key part of assessment: the "feedback loop" that occurs when assessment processes ensure data gathered from teaching and learning meaningfully influences program design and pedagogy, thus impacting future teaching and learning [23]. But in the same way iteration can be limited in adaptations of design thinking to writing research, assessment sometimes fails to advance beyond a linear, fixed-term institutional requirement. Kastman-Breuch and Sadler describe the tension between how we understand academic research methods in technical communication, and the need for programmatic assessment that often has different goals, measures, and audiences [15]. Our research operates at the intersection of these tensions. As a sustained research site located within institutional frameworks, we must demonstrate our value to funders, administrators, and potential students. We are also committed to building practical, research-based methods for leadership and collaboration that are inclusive, support diverse faculty and student needs. Balancing these very different goals requires ensuring assessment practices are imbued with the methodological goals we describe above: care in describing particularity, a commitment to transparency, and persistence in iteration.

Complications can also arise in developing research-based assessment designs when those conducting the assessments collect data from their own classrooms [41]. Furthermore, as Walton and Agboka argue [40], a social justice approach to TPC research requires careful attention to methods, not just the goals and outcomes of research. The ethical decision-making involved in making our own project a site for research is at the forefront of our thinking as we combine data collection with participant interviews to better understand the gaps and opportunities for improvement in our own best practices. Our goal is ensuring what we learn about any shortcomings in our attempts to be inclusive are addressed on both the short and long term.

2.5 Personas, While Familiar, Must Be Data-Driven

The methodology we use to build personas is familiar to user experience designers, drawing on approaches developed by Cooper [7], and popularized in web usability [20]. In earlier work, we summarized thusly:

> Personas, a common user experience tool, are realistic but fictional people that typify users likely for given contexts of use—in our case, student professional development. Like typical personas, ours are derived from research, in this case real people that represent important demographics reflecting the diversity of our Crow team. As in user experience contexts, personas offer Crow a way to easily share insights with researchers and developers alike. [4, p. 3]

Personas have gained widespread traction because of the appeal of narrative and relative ease of constructing them. But actionable, situated personas require research. It's not enough to build idealized portraits of users based on the models designers bring to the table—in fact, that simply reinscribes existing biases [6]. Personas only work when they accurately represent the findings of research—in our case, the interactions of Crow team members, the results of our collaborations, and the successes and shortcomings of our attempts to make distributed work more sustainable and ethical.

Our approach to personas is adapted from Quesenbery [29, 30] and is consistent with contemporary representations in user experience [21]. In the next section, we describe this motivation of personas in more detail.

3 PERSONA DEVELOPMENT METHODS

Persona development methods, as we describe them here, are designed to assess our implementation of the CDW framework (core principles, best practices, and orientations to work) within Crow. As demonstrated in a previous SIGDOC experience report [4], we began with the experience of researchers through ethnography and participant interviews to examine how researchers actually experience the best practices, core principles, and approaches, activities and outcomes in their day-to-day work. For example, we asked questions about collaborative writing, using our team communication platform (TCP) Basecamp, with a focus on researchers' levels of confidence and comfort when doing Crow work. Drawing on those interviews, we selected a set of relevant threads from Basecamp to-do lists, identifying relevant written artifacts such as meeting notes and document drafts. We then used a reflexive descriptive coding process, drawing on both artifacts and interviews, to help us identify trends and patterns that led to researcher personas.

As we prepare for the next iteration of this study, we are sharing both a more detailed explanation of that coding process, and our plans for further developing these methods for ongoing assessment. In the first iteration of persona development, we started with ethnographic notes from two of the authors (Banat and McMullin), as well as interviews from four other Crow researchers, to help us triangulate which textual artifacts would be most useful to persona development. Adopting Quesenbery's [29] model helped us focus on:

1. descriptions of Crow contexts and environments with emphasis on material, social, and artifactual infrastructures;
2. how Crow researchers make decisions when they collaborate;

3. how Crow researchers respond to activities in their collaborative environments;
4. how Crow researchers interpret peer activities and behaviors;
5. how Crow researchers deal with affordances and constraints of infrastructure as well as the affordances and constraints of collaboration;
6. anecdotal stories Crow researchers share with us.

Developing a coding schema from these interviews and the artifacts we chose to examine was holistic and collaborative. Our goal in this case was not to code data line by line, but to look for patterns and themes that would guide persona development. We examined the transcribed interview data, and we highlighted verbatim statements suitable for the storytelling essential to personas [30]. The purposeful design of interview questions allowed us to capture metadata about each Crow researcher participant, the types of activities and tasks they were engaging in, the modes, artifacts and channels of mentorship, as well as their experiences of collaborating with peer Crow researchers. Designing the interview questions with Quesenbery's model [29] in mind helped us infer the axial thematic codes for data analysis. Through individual analysis from each author, then collaborative discussion, we chose six categories:

1. Personal characteristics (demographic);
2. Goals and tasks (derived through internal documentation);
3. Motivations (dispositions, ways of thinking, external constraints);
4. Attitudes and needs (ways of working in teams and spaces, dispositions, kind of instruction);
5. Stories (from interviews with participants);
6. Quotes (specific language from participants that illuminated experience).

Using the information we coded from each participant, we worked collaboratively to develop personas that would help us to highlight successes and address potential gaps related to how we implement the CDW framework moving forward. In our experience report [4], we included personas for undergraduate and graduate researchers. As a further example, we share here a persona for early career faculty.

3.1 Example Persona: Dr. Jamal Saif, Early Career Faculty

Summary: A former Purdue graduate student who is now in a junior faculty position with research, teaching and administrative responsibilities. Working to balance research and publication requirements with ongoing responsibilities to Crow and new administrative roles.

3.1.1 Goals and tasks completed.

- Engaged in ongoing Crow research projects;
- Wants to establish Crow research sites and collaborative projects and new home institutions;
- Contributes to Crow administration and ongoing grant funding strategies.

3.1.2 Motivations, attitudes and needs.

- Commitment to Crow goals and core principles;
- Working toward tenure and promotion;
- Adept at balancing research and teaching as a GTA, now transitioning to faculty roles;
- Seeks advice and mentoring from colleagues and former advisors who are now collaborators as well as mentors;
- Describes specific ways that Crow work (grant writing, event planning, research collaboration) informs their approach and helps to build rhetorical confidence in new contexts.

Quote: "Learning to navigate and sustain Crow infrastructure took time and attention, but has helped me understand the underlying principles and develop the rhetorical confidence to expand that knowledge and commitment to ethics and sustainability to other aspects of humanities research."

4 BUILDING RELEVANT AND ACTIONABLE PERSONAS

Our previous study [4] focused on grant writing because it is an integral part of the Crow project, and an activity that engages most team members at some point in the writing process. As we develop the next stage of this research, we are widening our scope to better assess CDW methods across all Crow tasks: administration, software development, text collection, research and outreach. We are guided by a commitment to transparency and dialogue that ensures participants have a voice in every stage of the research, from data collection to analysis and writing.

We begin with two central research questions that build on previous work, and help us to refine methods for ongoing assessment:

1. How can we assess our CDW framework within Crow? (How do activities, approaches, and outcomes operationalize core principles, and best practices sustain activities, approaches, and outcomes?)
2. What influences the internal implementation of CDW? What affordances help us address complications and iterate?

While these questions are specific to the needs of our team, we believe the methods and tools we develop can inform the work of other researchers, and offer tools that can further ethical research practices not just for our team, but for the field. This study includes two phases: data collection from Crow documentation, then semi-structured interviews informed by coding and data analysis. Each of these phases includes multiple member checks that give participants agency in how their work and experience is represented in the personas we develop.

4.1 Phase One: Gathering Contextual Data

Because distributed work relies on documentation for coordination, we are developing methods that leverage the API of our team communication platform (TCP) to gather a larger data set. We are informed by the principles of statistical genre analysis [12] and by our Crow colleagues in applied linguistics who can help us to use descriptive analysis to respond to qualitative research questions. Because we consider our developers members of the Crow team, they understand how Crow researchers interact with our TCP, with Google Docs, and how we write collaboratively. Because CDW maps specific activities and best practices onto our core principles,

we can use those activities to help us organize a data set that includes the more informal communication that happens in group chat spaces and to-do lists in our TCP. Via the language in meeting notes, agendas, and comments on Google Docs we can begin to uncover the tacit knowledge that informs Crow work, and identify examples that can inform participant interviews.

We recognize this kind of data collection, using the words and experiences of study participants, might raise concerns about both privacy and representation for team members. In order to address these concerns ethically, our research design process is open for review, shared in research memos with the whole team prior to recruitment. We are also including two member checks in this first phase. After data collection, before we begin analysis, participants will have an opportunity to review the selected data set and approve or reject the threads, chats, and documents we wish to analyze. We will exclude at this phase any data that our participants are uncomfortable including. Later, we will conduct a second member check, inviting comments on our coding process and characterization of experience and activities drawn from the data set. This reflexive process is central to attending to the ethics of this kind of internal assessment that engages researchers who are mostly students as participants. It also deepens our understanding and creates more pathways for analysis informed by the experiences of our team.

4.2 Phase Two: Interviews

The data present in our collaborative platforms help Crow researchers reconstruct the tacit knowledge they have developed while working on tasks, activities, and approaches to collaboration. Drawing on specific examples from our data analysis, semi-structured interviews will engage both the interviewers and participants (both Crow researchers) in retrospective reflection that does not only depend on memory recall. Smagorinsky [36] frames such work as a form of retrospective protocol analysis, an investigative tool, in which participants reconstruct the process of working on a task from memory after they have finished completing the task. Adopting these reflective assessment methods will help us evaluate the social and cultural processes of collaboration we experience in Crow. After conducting interviews, we will adapt the coding developed in phase one and apply it to the interview transcripts so we can read the document analysis in relation to the experiences and explanations derived from interviews.

As outlined in the methods section, we are formulating interview questions based on Quesenbery's [29] model premises and the CDW operational framework. We are asking questions about the outcomes of those activities and collaborative moves for their own development and the advancement of the project the team was working on. We will also have explicit questions about where they see the applicability and lack of the CDW core principles and best practices. We do not limit our assessment of CDW to our own analysis (the authors of this manuscript); we are engaging our peer Crow researchers in this analysis for the purpose of triangulation of multiple perspectives, experience, and knowledge. We plan to adopt our aggregate persona development approach [4] to create personas for undergraduate student, graduate student, new faculty, and PI Crow researchers, though the specific roles will be developed based on the data we are gathering.

Collecting multiple insights without identifying individual researchers allows us to evaluate the networked model of collaboration in Crow to understand how context, participants, and tools enhance or impede a team from reaching short- and long-term goals. Our data-driven approach to self-assessment through personas is helping us evaluate the interconnectedness of material and sociocultural infrastructures to identify both affordances and gaps in collaboration. The value of this methodological approach to assessment helps us identify successful trends of collaboration that routine and informal reflections of everyday practices in Crow do not facilitate. It further triggers constructive conversations about gaps and barriers that necessitate responsive actions.

5 MAKING PERSONAS A METHODOLOGICAL TOOL

More careful attention to the methods in research of distributed work—particularly in contexts of ongoing distributed teams—is essential to enable transparency for team members who are also participants in that research. Since results of research directly impact team members, from an ethical and justice-oriented standpoint, it only makes sense that those team members are able to see how the research they are participating in is used, and to participate in the building of that research. In addition, careful reflection on methods enables better assessment of teams and teamwork, allowing for more deliberate refinement and iteration of team research, goals, and other activities.

In the case of Crow, the choice to center our research methods on persona development has multiple layers of benefits. First and foremost, it improves the research itself, from participants who engage in retrospective reflection to the research team which engages in self-analysis and reflection on research practices. As we describe above, our methods included interviews with Crow team members. Many of these participants will also contribute to further research, and thus that reflection affects the design of their own research methods. As for the research team itself, the act of coding these interviews required us to consider the various categories that were impacted by and had an impact on Crow practices. The codes we chose (personal characteristics, goals and tasks, motivations, attitudes and needs, stories, and quotes) were a result of this dual reflection by participants and researchers. As we move forward with additional research into CDW and its impact on Crow, these same methods will enable both our participants and us to be more reflective in our methods and our work in general.

Second, the use of persona development allows us to assess strengths and gaps in the implementation of the CDW heuristic in practice, and not solely in theory and principle. Crow workflows and practices are approached from a CDW standpoint, but as we engage in persona development, we can see how our practices impact team members. The dual reflection mentioned above gives researchers a chance to see how participants are experiencing distributed work that was built on the CDW framework. In the case of our undergraduate research participants, we developed a persona that had a diverse range of experiences in Crow even though they did not feel that they had a direct role in grant writing. This and similar findings have encouraged us as a team to change our approach to mentoring collaborative writing. As we onboard new

researchers, we focus on assigning specific tasks to each individual so that they have more at stake in each project. As we work collaboratively on documents, we also create clearer, more specific requests for feedback from all involved with that document. This is especially important as we work with new researchers or other teams within Crow. Expanding our development of personas beyond grant writing and into general practices of CDW throughout Crow distributed work will enable us to shed light on other similar gaps that we will then be able to address.

In this way, then, persona development results create a feedback channel and enable iteration. We work with team members, get firsthand descriptions from them that serve as feedback on their experience in distributed work. We then build personas, which let us see gaps in our processes as a team. We adjust and iterate our processes, at which point the process repeats itself: gather feedback, develop personas, find gaps, adjust teams. New researchers can review personas and indicate where their experiences differ from our expectations. With every iteration, adjustments can be made based on the needs of new team members with different backgrounds, new contexts that demand closer attention, and new team goals or projects.

Assessment of the CDW framework promotes its visibility and results in a list of evidence-based methods for more effective implementation. From our own research and assessment of CDW, we have built public-facing documents about our onboarding process (Onboarding Explainer) and the tool we use multiple times each year to assess researcher interests and division of tasks (Matrix Explainer). These are living documents that are updated as new research indicates better ways to approach these practices, but they also represent a way to share our work beyond our own team and even beyond academia. Assessment of CDW through reflective attention to methods can also influence larger conversations about what ethical and sustainable practices for research teams can look like. As we carefully and reflectively examine our research methods, we see more clearly how our work benefits participants and team members. Our methods have led us to carefully examine how Crow onboards new researchers and to articulating some of our ethical practices. We acknowledge, for example, that new researchers arrive with a diverse set of skills, knowledges, and interests, and we seek to match those researchers to the teams in Crow that will best serve those skills, knowledges, and interests.

The iterative and reflexive nature of our assessment includes assessment of the digital tools we use to support work. Basecamp has formed the background of our team communication for five years, and it has been effective. However, executives at Basecamp recently gave employees notice that political discussions at work would be banned, and many employees left the company as a result [19]. While we are still learning more about this situation, including how Basecamp and its employees will react, we are concerned because we know digital tools and platforms are not neutral, and their inherent biases and politics influence our work. As such, while we engage in finding data through the team's past work in Basecamp, we also are also considering what elements of Basecamp are central to our work, and how other platforms might support us in similar ways.

We see the methods as we've outlined them here being useful for other teams as well. Overall, CDW is a heuristic process by which teams can set up infrastructures and frameworks that ensure that their own work ethically benefits the members of their teams. Such ethical frameworks also enable more productive collaborative environments. The coding scheme we developed for our evaluation of persona development is something other teams might apply in their own assessments. While the six categories we developed through our own coding (personal characteristics, goals and tasks, motivations, attitudes and needs, stories, and quotes) may not apply to every team in every situation, they can serve as a starting point as teams seek to build personas of their own team members to evaluate the gaps in their own distributed work practices. Teams can take the iterative nature of CDW assessment to gather feedback from their team members, find needs or gaps to fill, make adjustments or changes as necessary, and then repeat the process to further strengthen their own teams in thoughtful, ethical ways.

These takeaways demonstrate why it is important to have these conversations about methods. CDW demonstrates a transparency in its methods to both participants and researchers, to individuals who are part of the team as well as others who are outside of it. Such transparency enables more robust feedback, deeper reflection, and more refined iteration of the team as it continues to develop and grow. Moving forward, our own research will seek to expand this reflection beyond grant writing and into other aspects of Crow work, thus further expanding the ways by which our team members can benefit from their participation.

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