Designing a Social Matching System to Connect Academic Researchers with Local Community Collaborators

DOUGLAS ZYTKO, Oakland University, USA
LEANNE DEVREUGD, Oakland University, USA

This paper reports on efforts to design a social matching system that instigates collaborative research across multiple fields of practice, in this instance: researchers from academia and organizations in their local geographic community. A qualitative study is presented about university researchers and the design of their profile pages for the system. Findings show that university researchers prefer profile page designs that enable them to demonstrate a willingness to adapt to non-academic partners, such as by de-emphasizing esoteric markers of expertise like scholarly publications and clarifying their resources and goals. Some also wish to circumvent potential bias by omitting information about their name, physical appearance, and academic department. However, these desired omissions raise questions about how to design for sufficient distinction between profile pages and the presentation of a unique professional identity. Implications are discussed for the design of social marching systems for collaboration.

1 INTRODUCTION

The 1940s were a pivotal time in the history of computing. Several foundational computer inventions were borne out of World War II and for the purpose of war, like Alan Turing's bombe machine [11] and Colossus [12], which were used to decipher coded Nazi messages. While military-use continues to drive some computing innovation [39], WWII-era technologies laid the groundwork for a broadened post-war role of computers—to augment human intellect and

Author's addresses: D. Zytko, Oakland University, Engineering Center, 115 Library Drive, Rochester, MI 48309, USA; email: zytko@oakland.edu; L. Devreugd, Oakland University, Wilson Hall, 371 Wilson Boulevard Rd, Rochester, MI 48309, USA; email: ldevreug@oakland.edu.

capabilities, as envisioned by Vannevar Bush in his 1945 article about the fictional Memex device [8].

A theme in the lineage of computing technologies since then, including some directly inspired by Bush's writing [36], is the enabling of groupwork and collective problem-solving: examples include Engelbart's oNLine System [16,40], ARPANET [27] and CYCLADES [35] (predecessors to the Internet), and more recent tools like cloud-based document editing. Despite an array of tools enabling collaborators to work together, the *identification* of collaborators stands to be better supported by technology, especially collaborators from different fields of practice. In this paper we consider academic researchers in particular (those that work within higher education institutions) as a demographic that could be well served by this technology because of aspects to the profession that may normally alienate non-academic collaborators [3,19], such as career aspirations (e.g., publication) and responsibilities (e.g., teaching). The potential benefits of collaboration between academic and non-academic entities are extensive, including funding, access to data, skillsets, manpower, access to study participants, and unique perspectives or approaches to problems. Indeed, some of the most notable technological advancements have crossed academic, governmental, and industrial lines—see Google [41], ARPANET [27], and Xerox Star [25,28] as just a few examples.

Perhaps the most immediate candidates for collaboration with academic researchers reside within the local communities around academic institutions—local industry, non-profit organizations, local government entities, and so on. The geographic vicinity of these potential collaborators can facilitate exchange of resources like equipment, face-to-face interaction that can establish familiarity and closer relationships, and active involvement during data collection. Of course, the idea of academic/industrial collaborations is not novel—such collaborations have occurred, and will continue to occur—but we urge the reader to consider the conspicuous absence of technologies intended to foster these collaborations at scale.

There are technologies studied in the HCI literature that could help facilitate academic researchers in better connecting with local community partners, if intentionally designed to do so. One example is social matching systems [38], which are recommender systems that connect people to people. The potential of social matching systems to impact social life has been evidenced with the success of online dating systems [9,30]. Yet social matching systems could be designed to augment interpersonal discovery for many other reasons, such as collaborative research and innovation.

This paper details the initial efforts being undertaken at the authors' institution, Oakland University, in creating a social matching system that connects faculty researchers with local community partners for collaborative research opportunities. These efforts involve a focus group and participatory design study with faculty members to learn what and how they want to self-present through the interface to potential collaborators outside of academia. The study provides generalizable implications for the design of social matching systems for collaboration.

The rest of the paper is structured as follows. First we review theory regarding how academics craft their identities as researchers in order to establish collaborations in their primary communities of practice (their research fields). This review serves to highlight potential breakdowns in communication when a researcher tries to convey their identity and expertise to foreign communities of practice (those outside of their research field). We then discuss social matching systems as a potential tool for supporting collaborations across communities of practice, and questions regarding how to design such interfaces. The paper then moves to the social matching system that our university is creating to connect faculty with local community partners,

and our study of faculty members' needs and preferences for the system. Finally, the findings are interpreted through the lens of theory and implications are proposed for our immediate system, as well as social matching systems more broadly for collaborative research and innovation.

2 BACKGROUND

2.1 Conveying Identity and Establishing Collaborations as an Academic Researcher

The establishment of professional collaborations implies that all parties have deemed each other to be capable and compatible partners. The identification and evaluation of potential collaborators provides opportunity for impression management [20], or self-presentation of qualities that would make one appealing as a collaboration partner. Regarding the profession of academic research, de Certaeu [10] identifies an academic researcher's writing as the central construct through which they are evaluated by their peers. Using Goffman's dramaturgical view of impression management [20], writing can thus be considered a primary stage on which academic researchers "perform" their professional role and aim to control the impression formed of them in professional contexts. Kamler and Thomson support this view, positing a "writing identity link" [23] in which the act of writing—through journal and conference publications, grant proposals, books, lectures, and so on—is a form of identity work for researchers in academia; a conduit for crafting and presenting one's identity as a scholar and expert on particular topics and methods.

Academic researchers typically have an intended audience for their writing (performance), which shapes how the writing is produced [1]. This intended audience can be conceptualized across multiple, layered social contexts according to Fairclough's model of discourse [17]. Kamler and Thomson translate Fairclough's model to academic writing specifically (as we visualize in Fig. 1), placing the written text at the central layer [23]. The second layer features immediate examiners of the writing, which can include manuscript reviewers, audience members at a conference who may directly question the author, and committee members. The third layer comprises the broader "communities of practice" [43] that the writing is intended for and the writing norms inherent to those communities.
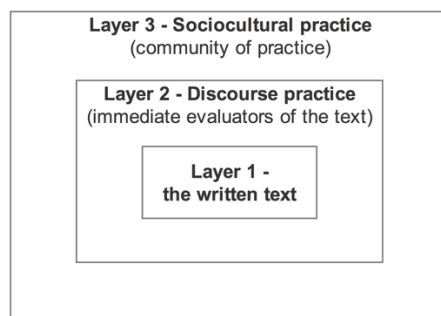
Fig. 1. Fairclough's model of discourse conceptualizes the layered contexts in which a piece of writing is produced (bolded text in the figure) [17]. Kamler and Thomson applied this model specifically to the writing of academic researchers (non-bolded text) [23].

The concept of a community of practice (or CoP) borrows from Wenger [43], who uses the term to define a group of people who share a profession. But more specifically, communities of practice feature participation by members in the form of collaborations and communications that

maintain a sense of community and disseminate shared norms [26]. Academia itself is a community of practice, but within that, academics are members of more granular communities of practice based on their specific disciplines and research topics [14]. Membership in a community of practice requires particular expertise and adherence to particular norms, and an academic researcher's writing—and therefore, professional identity—develops to adhere to those norms and convey expertise in the expected ways [4].

Writing within the norms of a particular community of practice facilitates collaboration between members [23,43]. Potential collaborators can quickly assess that one has expertise (through, for example, acceptance of papers to well-regarded conferences or journals), and they can readily understand one's specialized interests or skills (through, for example, use of niche terminology that members of the community have informally agreed upon and use in their literature).

However, writing that caters to a particular community of practice may alienate potential collaborators from other (non-academic) communities. Niche terminology may be unfamiliar, and the kinds of writing generally used to convey expertise may vary. Considering that an academic researcher typically writes for (and therefore crafts their professional identity for) a very specific community of practice over their career, opportunities for collaboration with outside communities of practice may be stifled.

2.2   Social Matching Systems and the Potential to Initiate Collaboration

Video conferencing software, cloud storage, word processors, and smart phones are just some of the technologies that support collaboration and groupwork. Yet technologies intended to instigate new collaborations, particularly across different communities of practice, are not as pervasive. Social matching systems are one technology discussed in the HCI literature [24,31,38,44] that can address this issue. Social matching systems, at a fundamental level, make users aware of relevant others for various social interests. The designs of social matching systems generally consist of a profile page for each user, a mechanism for recommending or facilitating discovery of other users, and interface components for direct interaction between users, such as text messaging [18].

While the most prominent types of social matching systems are perhaps online dating apps [9,15,44], social matching systems can also be designed with collaboration in mind. In Terveen and McDonald's 2005 paper outlining a research agenda for social matching systems, they highlight "social recommenders for information needs" [38] and describe scenarios in which social matching systems could be used to aid in the discovery of individuals with sought-after expertise. The term "expert recommender system" has similarly been used to describe applications that display potential experts in response to a search query [34]. Specific instances of expert recommender systems, or social recommenders for information needs, have generally been intended for use by employees within a single organization. For example, *ReferralWeb* mines a user's existing network of professional colleagues to identity an expert for a user's information need, but it specifically does not look at "new communities" that could provide assistance [24] (p. 64). *SmallBlue* [29], *Expertise Recommender* [32], *Do You Know?* [21], *Lotus Connection* [22], and *ExpertFinding* [34] are additional examples of such systems intended for use within the context of one's own organization and coworkers.

It is understandable in some industry contexts to restrict expert discovery to within a single organization (to protect trade secrets and the utilization of talent for a competing organization's gain), but professionals in contexts like academia need not be restricted by organizational boundaries. In more recent years, systems like *ResearchGate* and *Academia.edu* have become

popular ways for academic researchers to share their work and expertise—which could instigate collaborations—yet the userbase and, therefore, audience of these presentations are predominantly other academics. Social matching systems for work-related needs have also recently emerged, like *Bumble Bizz, jitjatjo*, and *Ripple*, which match users offering and seeking employment opportunities. However, they do not cater to collaboration (i.e., users working together, as opposed to "for" one another). A rare example of a system that could, in premise, facilitate discovery of potential collaborators across communities of practice or organizations is MITRE's Handshake [13]. The system is designed for MITRE employees and partners to build a network of professional contacts within and outside of their organization.

We consider a primary impediment to the growth of social matching systems for collaboration to be operationalization of professional identity in the interface that maintains interpretability to unfamiliar communities of practice. Prior work into impression management suggests this is a significant design challenge. For example, Bozeman and Kacmar's self-regulation model indicates that impression management is driven by a reference goal, or an intended impression that is in in-line with the audience's expectations and preferences [7,45]. This requires an individual (the performer) to possess an understanding of those expectations. In the context of cross-community collaboration, academic researchers may lack an understanding of their audience's preferences, and may thus be indecisive in their reference goal. Furthermore, one's audience of potential collaborators may represent several different communities of practice, each with their own preferences that a researcher may want to accommodate in their self-presentation. This echoes the problem of context collapse in social media [5,42], in which self-disclosure choices are complicated by the loss of control over the different audiences that can view one's online content.

3 TOWARDS A SOCIAL MATCHING SYSTEM TO CONNECT ACADEMIC RESEARCHERS WITH LOCAL COMMUNITY PARTNERS

Through collaboration between Oakland University's research office, tenure-track faculty, and a local software development company, a social matching system is currently in development to facilitate connections between faculty researchers and local community partners. Given the university's geographic location, probable community partners would consist of automotive industries, entities focused on revitalizing urban areas with a history of crime and abandonment, and nonprofit organizations in the health sector.

The current design of the prototypical system supports a profile page for each faculty researcher, along with a filtering mechanism to support local community partners in discovering faculty that match their research needs. Feedback from the university's faculty at department meetings indicated a desire for the system. As such, our initial objective focuses on establishing buy-in from local community partners. Specifically, we aim to prepare a prototype for community partners that is pre-populated with profile pages of faculty researchers, therefore increasing the chances that initial testers will identify appealing collaborators and be enticed to continue use of the system. Profile page design will optimally involve input from both types of stakeholders: academic researchers and non-academic community partners. In this paper we focus on academic researchers, and how their perspective can inform the initial profile page design. Specifically, we explore the following research questions:

RQ1.   *What content do academic researchers want to present to potential collaborators outside of academia?*

RQ2.   *What role does scholarly writing (e.g., publications) play in this preferred content?*

RQ3.   *How would academic researchers design their profile page to inform and attract potential collaborators outside of academia?*

We also aim for the study to inform the design of social matching systems for cross-community collaboration and innovation more broadly. In line with that goal, we also ask:

RQ4.   *What implications can be derived from study of academic researchers for the design of social matching systems for collaboration across communities of practice?*

4   METHOD

To explore the aforementioned research questions, faculty researchers at Oakland University were recruited for a focus group to discuss their self-presentation preferences and needs for the social matching system intended to connect them to local community partners. The focus group also included a participatory design exercise in which each faculty researcher created a paper prototype of their profile page.

4.1   Participants

Email invitations for the focus group were sent to 58 tenure-track research faculty across the university's various schools who had recently participated in a program run by the research office intended to develop faculty members' research agendas through periodic seminars and meetings. While senior faculty are also intended users for the social matching system, tenure-track faculty were targeted for this initial study because several had personally expressed interest in the system to research office personnel, along with a general interest in tools for expanding their research output to secure tenure.

Sixteen faculty responded to the email invitation, and 10 faculty (5 female, 5 male) ultimately participated in the focus group (the other 6 had scheduling conflicts). The participating faculty represented the following departments: Computer Science, Health Sciences, Human Development, Physics, Communication, Writing & Rhetoric, Biological Sciences, and Nursing. The focus group was moderated by a faculty researcher in the department of Computer Science with a specialization in human computer interaction, and a representative from the research office. Two representatives from the local software development company charged with developing the social matching system were also in attendance, but only as observers.

4.2   Data Collection and Analysis

The focus group took place in a private meeting room on the university's campus. The discussion began with a description of the broad goal of the social matching system under development: to connect research faculty with local community partners for collaborative research. Local community partners were described as any local companies, nonprofit organizations, government entities, or otherwise non-academic institutions that were based geographically nearby. It was emphasized that faculty feedback would directly inform the design of profile pages in the system.

Participants were first asked to give their general reactions to the idea of the social matching system. They were then prompted to discuss the information they would want potential collaborators to know about them, and the types of information that would inform local community partners' decisions over which faculty members to contact.

Participants then engaged in a participatory design exercise. They were each given a piece of paper with an empty rectangle and asked to draw what they would want their profile page to look like in the system. The drawings were used to prompt further discussion about profile page design

and how participants' design choices related to their self-presentation needs and the anticipated audience of their profile page.

The focus group discussion lasted for 79 minutes and was voice recorded. The recording was fully transcribed, and an iterative coding process was conducted on the transcript, which involved line-by-line coding according to Strauss and Corbin [37] and then iterative review of the coded transcript to identify and refine theoretical categories and conclusions. The profile page designs were not included in the iterative coding directly because their purpose was to serve as prompts for verbal discussion rather than as a distinct data source. Categories from the first round of coding revolved around broad factors that the faculty wanted to self-present to community partners, and factors that they wanted to de-emphasize or omit from their profiles. The second round yielded more granular codes for self-presentation factors, and delineated faculty motivations for self-presenting these factors. The third round produced more thorough codes for the factors that faculty wanted to de-emphasize in their profiles, and motivations for doing so. Subsequent rounds identified holistic impression objectives or reference goals that connected the factors that faculty wanted to emphasize and de-emphasize, as well as assumptions about community partners that were driving the faculty members' intended impressions. Participant quotes are included in the findings below to exemplify emergent themes. Samples of paper prototypes are also included to visualize ideas reflected in participants' verbal comments.

5 FINDINGS

Participating faculty reacted positively to the idea of the social matching system. They were interested in collaborations with local community partners as a way to broaden their domain of study and also because the nature of their research necessitated, or would be facilitated by, such collaboration.

P4: *"I sort of have [my academic] network set up, but more recently I've been trying to diverge a little bit and go out to different fields. So [...] my initial reaction to this is positive because it allows me to kind of advertise myself and get into areas of work that I'm not as familiar with yet."*

P6: *"I am in nutrition health sciences. And that field itself is very inherently community-focused where you're doing intervention work in the communities. [...] And so I, I personally as a researcher, I'm always looking for other partners in the community to find out what their needs are and how to develop programs that are suitable for those communities."*

Below we delve into findings about the information that academic researchers wanted to present to potential collaborators, and their ideas for profile page design.

5.1 The Understanding Academic

A central phenomenon, or selective code, that emerged during data analysis was a self-presentation motive (reference goal [7]) behind faculty members' ideas for their profile page. They wanted to present a persona that we dub "the understanding academic": one who recognizes the unique needs, limitations, and biases of non-academic partners and is capable of presenting their collaboration potential within those constraints.

One way participants considered to convey this potential was through descriptions of past, present, and future collaborations with non-academic partners.
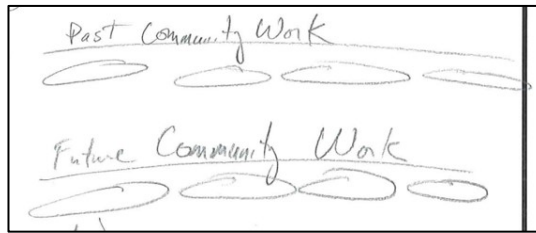
Fig. 2. P7 wanted to emphasize collaborations with community partners in their profile page design. They thought this could demonstrate an ability to adapt one's research acumen to a non-academic partner.

However, most of the participating faculty had little experience with non-academic partners, and so they considered other ways to accommodate and inform potential collaborators. Axial coding emphasized three additional types of information that faculty wanted to present in their profile page, pursuant of the "understanding academic" persona: their research expertise, their resources for collaborative research (beyond their expertise), and their motivations for collaboration with non-academic partners.

5.2 Research Expertise

Participating faculty contemplated how to convey their research expertise in ways that would be both understandable and quickly evaluated by local community partners. Several faculty preferred to omit scholarly publications in their profile page designs, while others preferred to de-emphasize them lower down in their profile, because of limited interpretability to those outside of their academic field. They considered publications to be a symbol of esoteric knowledge that would likely give off a negative impression to non-academic partners.

P6: *"If you're working with a nonprofit in the community, for example, if you come across too erudite, that could turn some people off. Like who does this person think that they are? [...] I wouldn't want in mine to have publications all over the place because that's probably not what is going to be attractive to them."*

In lieu of publications, the faculty suggested profile sections for research skills, methods, and populations that they typically study. These ideas were proposed because they could be succinctly presented in profile pages, and therefore quickly evaluated by prospective collaborators. However, some faculty chose to omit the department in which they work in order to avoid potential bias against their field of study. They imagined some community partners having preconceived notions of which departments would be appropriate for their research needs, and they did not want to be passed over if their methods of expertise were otherwise applicable.

P6: *"Maybe there's somebody in engineering that's working on a diet tracking app. [...] I would've never thought of working with [them], but they're kind of doing stuff that could compliment my research. And the same [can happen] with the community partner."*

P7, emphasizing their interdepartmental research interests: *"So look at me, right? I sit in the interstices of political economics, sociology, communication. Right? The humanities and social sciences, science and technology. Where [...] do I fit?"*

Discussions of bias extended to other variables that could negatively impact impressions of their expertise. A few faculty opted not to include a picture on their profile page design because they considered their physical appearance irrelevant to their research acumen, and pictures could convey some demographic traits such as their gender and ethnicity that they imagined could

negatively impact evaluations from community partners. One faculty member also pondered the idea of removing their name from their profile to circumvent potential bias against gender and ethnicity.

P3: *"For me, the biggest thing I thought about was erasing names, gender. Like you know, here's, here's what [research] we do. [...] Like just, you know, reducing the amount of implicit bias as people are screening through these [profiles] and looking for potential collaborators."*

P7: *"That is a really good idea, and a really good point about implicit bias."*

5.3 Resources Available for Collaborative Research

Participating faculty acknowledged that resources available for research vary considerably amongst academic departments and individual faculty members. This makes it difficult for non-academic entities to predict what resources an academic researcher can bring to a collaborative project. Participating faculty wanted to address this question in their profile pages with sections that clarified their resources, especially ones they considered uncommon or unexpected. Lab space and equipment was one example discussed.

P5: *"[My research lab] is worth more than half a million [dollars]. [...] We can offer research expertise and labs. We can put it on [our profiles]."*

Time was also brought up as a limited and valuable resource. The faculty did not want the existence of their profile page to imply that they needed a collaborative project to fill up their already-busy schedules. Yet faculty also did not want to insinuate that they were unapproachable or permanently unavailable for collaboration. One way they thought to convey the value of their time, and the time they had available for new collaborations, was through a "current projects" section in their profile page that clarified their time commitments and responsibilities.

P2: *"So that's the challenge. [...] I'm trying to get tenure and do all these other things where you're like, this is not just like the one thing that I'm doing at any given time."*

P8: *"It's like setting up [...] what you have to offer and what you're willing to commit to them, as far as time and all of that. [...] So it's like anything that they could spell out from the get go as to what [each partner is] willing to commit to the project."*

The emphasis on time segued into a discussion of student research assistants as a labor resource. Some faculty explained that student researchers enable them to undertake collaborative research projects that they would otherwise not have time to handle alone. These faculty viewed their role in the social matching system more as facilitators or mediators between local community partners with research needs, and students who may be conducting most of the actual research. Their profile pages would not just be presentations of themselves as individual researchers, but as leaders of constantly changing research teams whose members have varying levels of expertise.

P2 on their role as mediator between student researcher and community partner: *"So for me, the biggest challenge of [a collaborative] project is the logistics of matching [the local community partner with the student researchers], right? To make sure that everything will go smoothly."*
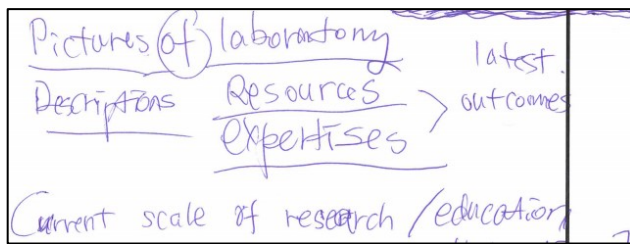
Fig. 3. P5 wanted to use their profile page to emphasize resources they could contribute to a collaboration. Ideas included pictures of their research lab, text descriptions of their resources, and the "current scale" of their research to convey time availability.

In this regard, the point of emphasizing student research assistance in one's profile page was two-fold: 1) to advertise a labor resource, but 2) to also clarify to non-academic collaborators that the faculty members themselves may not be personally conducting the research. Participating faculty hoped that displaying the role of student researchers would imply to community partners that projects may take longer to complete because students' work would need to be reviewed.

P9: *"When it comes to working with a community partner, and especially with undergraduates or even grad students, there's a lot of hand holding involved. Right? So that research project, I can do it. [...] But doing it with community partners and their sort of world and the culture and then students as well. We move slow."*

P2: *"I want to know what [the community partner's] expectation is for the quality of work. [...] So I'm working with a student who's taking like a semester of editing class. So there's no guarantee that they're going to be good editors. So I'm like, I'm not going to say he's going to be like perfect, but [...] whether or not a community would think that would be quote unquote good..."*

5.4 Motivations for Collaborating with Non-Academic Partners

Participating faculty pondered their motivations for collaborative research, and how those motivations may (mis-)align with assumptions of local community partners. They concluded that local community partners would harbor two assumptions: that academic researchers would expect 1) financial support from their partner, and 2) publication of the collaborative research. These expectations were acknowledged as potential barriers to collaboration, because partners may not have financial resources, or they may not wish to disclose study results. While the faculty did value financial support and publication, they discussed other motivations that may not be as obvious to non-academics, and instances in which they would consider a lack of financial support or inability to publish as acceptable drawbacks. Some examples of these motivations included the establishment of long-term working relationships with community partners, opportunities for students to develop research skills, and satisfaction of service requirements for tenure.

P1 on the motivation for long-term partnerships: *"So like it might start off as just, 'can you help me do a needs assessment in the community?' And then that needs assessment once that's done, blossoms into 'let's start intervention development.' So that one little project piece might blossom into other multi-phase aspects of a bigger project."*

P5: *"Not to be cliche, but [I would do a collaborative project] for the community good. You know, it's, it's part of service [requirements]. It's part of contributing to the community around you and doing good work in that way."*

Several faculty proposed profile page sections to clarify their motivations for collaboration and acceptable drawbacks so as to attract potential collaborators with constraints typically assumed to

alienate academic researchers. Some faculty members also suggested a "contact me if…" call-to-action in their profile page that would highlight their primary incentive or desired resource. This was intended to serve as a prompt for qualifying community partners to realize mutual benefit of a collaboration and initiate contact.

   P2: *"I thought about moving this up [in my profile page], 'contact me if you can…' and then fill in the blank, right? So what you [the local community partner] can offer. And so because you think of all like user centered design, right? We want to think about what the users want before what we want to show them."*
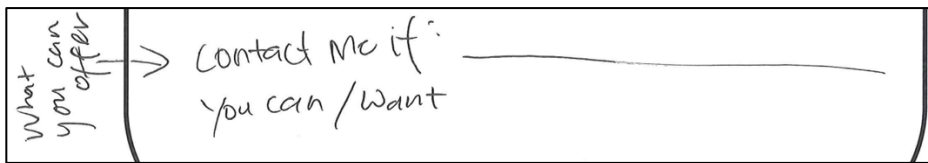

Fig. 4. P2 included a "contact me if" call-to-action to prompt potential collaborators to initiate contact if they possess a particular resource that the academic researcher needs.

6   LIMITATIONS

There are some limitations to the study that are worthy of note. For one, participants imagined their interface needs in an abstract sense and their preferences may change over time. The needs of participating faculty also may not be indicative of other researchers at their institution, or other institutions. The paper prototypes produced by participants also varied in content, and future work is needed to assess if a single interface design aimed at combining their myriad preferences will satisfy a broader userbase. In addition, some profile page ideas were intended to circumvent potential bias of local community collaborators. These concerns were not based on personal experiences with the local community and such community entities may not hold any of the presumed biases against academic researchers.

7   DISCUSSION

In this section we first interpret the focus group findings in light of impression management [20], Fairclough's model of discourse [17] and Wenger's communities of practice [43] in order to elucidate the ways academic researchers adapt their self-presentations to unfamiliar professional contexts. We then derive implications from the focus group that are guiding the profile page design for Oakland University's social matching system, which can also be used to guide the design of social matching systems for cross-community collaboration more generally.

7.1   The Challenge of Self-Presenting to New Communities of Practice

Academic researchers in our study were interested in using their profile pages to manage impressions formed by potential non-academic collaborators. Yet while reference goals for impression management [6,20] in other social matching systems often involve maximizing appeal to other users [15,44], academic researchers in our study were more interested in maximizing the value of their time. The preferred content for their profile pages aimed to help community partners correctly identify collaboration potential, or the lack thereof. This seemed to stem from

desires to increase research output and secure tenure—time-sensitive goals that would ultimately be hampered by interactions that do not culminate into fruitful collaborations.

Brainstorming profile page designs to accurately inform community partners proved challenging for our research participants because they did not know the identities of their would-be evaluators, which stood in contrast to the typical circumstances in which they present their professional identities through writing. Fairclough's model of discourse [17] is helpful in emphasizing the uniqueness of this challenge. Fairclough's model presumes that the author knows their (layered) audience and can thus produce their writing in accordance with the norms of that audience. Academic researchers typically know the direct evaluators of their work (layer 2 of the model) either by name or by general role such as how anonymous manuscript reviewers can be expected to have, or be working towards, a PhD in one's field. The community of practice (layer 3 – Fig. 1) is also generally known based on the venue for one's writing (e.g., a particular conference).

While the challenge of a loosely identified professional audience posed by our social matching system was new to our study participants, it is reminiscent of context collapse in broader social media use: the "flattening" of the various potential audiences of one's online self-presentation into a singular group or audience [5,42]. And rather than consider it problematic, our study participants came to see the collapsed context posed by our system as an opportunity to emphasize an openness to adapt to collaborators from new communities of practice. Indeed, some of the faculty considered any recognition of their primary communities of practice (e.g., scholarly publications, their academic department) to be a weakness in profile design; a signal that one's expertise is too specialized or otherwise inapplicable to outsiders.

However, this readiness to accommodate new communities of practice could be to the detriment of academic researchers. Writing within the norms of a particular community of practice allows nuanced discourse and presentation of professional identity. Stepping away from those norms can remove that nuance and risk an over-simplification of one's professional identity. So while academic researchers may successfully convey a willingness to adapt to a new community, they may inadvertently limit a potential collaborator's ability to identify the unique qualities that differentiate them from other academic researchers who list, for example, the same basic research methods or skills in their profile page.

7.2 Designing a Profile Page for Cross-Community Collaboration

We derived implications from our study to guide the design of profile pages for Oakland University's social matching system, called *Oakland Counts*. We consider the below implications to be a valuable baseline for the design of social matching systems more generally for collaboration across communities of practice. This is because the primary motivation behind the design implications is to produce a profile page design that supports presentation of and to professionals from various communities of practice, not "just" academic researchers to partners in their community.

Reconsider profile page identifiers according to collaboration relevance. The primary content and point of differentiation in profile page designs for today's popular social matching systems (e.g., *Tinder*, and even employment-themed systems like *Bumble Bizz* [2]) is a user's physical appearance—pictures usually take up most of the screen, and are accompanied by other appearance-related variables like age. Concerns over bias discovered in our study emphasize the need for a different way of identifying or differentiating profile pages for the context of professional collaboration. This is not to say that profile pictures should necessarily be removed,

or conveyance of physical appearance disallowed. Pictures are effective at grabbing attention, and they can convey information beyond physical appearance that the user deems applicable to collaboration. Participants in our study did offer some ideas along this vein, such as pictures of their lab space, equipment, and resources available for collaboration. Inspired by these suggestions, our social matching system intends to include profile pictures, but the interface will prompt research faculty to use pictures that convey qualities or assets they deem most germane to collaboration and expertise.

Enable profile pages for multi-person teams. Several of our study participants emphasized their role as a leader of a research lab, and their anticipated role as mediator between community partners and other (student) researchers who would be executing most of the collaborative work. To enable the expression of this mediator role, and the presentation of one's team/lab members, team profile pages should be facilitated. For our social matching system, we are considering profiles for individual researchers that are linked or nested under profile pages reflecting research teams or labs. A similar nesting structure can be employed for community partners that have multiple sub-entities soliciting collaboration.

Encourage the presentation of groupwork capacity. Collaborative projects, by definition, are not done alone. Beyond the presentation of one's expertise, our study participants were perhaps more focused on conveying a capacity for collaboration. In other words, they wanted to convey *shareable* expertise and a willingness to be an accommodating team member or partner. We are including three participant-suggested sections in our profile page design to encourage presentation of groupwork capacity: shareable resources, motivations for collaboration, and drawbacks to collaboration that one deems acceptable.

8 CONCLUSION AND FUTURE WORK

This paper identified social matching systems as an opportune technology for initiating professional collaborations across fields of practice. We introduced an endeavor at the authors' university to create a social matching system for research collaboration, specifically between university faculty and local community partners. We presented our initial efforts towards actualizing such a system: a focus group and participatory design study of academic researchers' preferences for profile page designs. This yielded generalizable design implications for profile pages in social matching systems that are intended to be viewed and evaluated by potential collaborators in disparate fields of practice.

We end this paper by informing researchers on ways to contribute to the design of social matching systems for collaboration. We do this first by highlighting research tasks that we consider fundamental to the design of such systems: 1) elucidating the (varying) self-presentation needs of the system's primary stakeholders, 2) formulating methods for introducing potential collaborators (especially from unfamiliar communities), and 3) augmenting user interaction in ways that reduce barriers to collaboration initiation. We situate the present study within the first research task.

Below, we outline the ensuing steps in the design of our university's social matching system. We hope this will inspire readers to further the research on collaborator matching systems by, for example, creating and reporting on their own versions of such an application. We organize these steps around a generalizable user-centered design process.

(1) Identify the most invested stakeholders to inform an initial prototype. This step comprised the focus group study presented in this paper. *(2) Initiate onboarding with invested stakeholders.* Our

next step involves soliciting faculty members to create profile pages and provide further design feedback—this time on a functional prototype instead of a purely conceptual idea. We are populating the system with faculty profiles first so that others stakeholders (local community partners with varying confidence in the system's premise) will observe an active userbase upon first exposure. We are using a survey with follow-up interviews for this step in order to reach a broader range of faculty, including senior faculty and those who have past experience with non-academic collaborators. *(3) Use the already-populated prototype to encourage further adoption.* We will manually identify local community partners that seem most compatible with early-adopting faculty. We will use a think aloud protocol to guide them through onboarding, inform the design of their profile pages and collaborator introduction/discovery, and build interest in sustained system-use. *(4) Personally mediate interactions between potential collaborators.* Once a community partner has exhibited interest in a discovered faculty member, the research team will personally mediate communication between the two entities to identify and remedy "pitfalls" in collaboration initiation and learn how to augment user interactions through system design.

ACKNOWLEDGMENTS

REFERENCES

[1] Howard S Becker. 2010. *Writing for social scientists: How to start and finish your thesis, book, or article.* ReadHowYouWant, LLC.

[2] Rena Bivens and Anna Shah Hoque. 2018. Programming sex, gender, and sexuality: Infrastructural failures in the" feminist" dating app Bumble. *Can. J. Commun.* 43, 3 (2018), 441–459.

[3] Toke Bjerregaard. 2010. Industry and academia in convergence: Micro-institutional dimensions of R&D collaboration. *Technovation* 30, 2 (2010), 100–108.

[4] Pierre Bourdieu. 1990. *The logic of practice.* Stanford university press.

[5] Danah Michele Boyd. 2008. *Taken out of context: American teen sociality in networked publics.* University of California, Berkeley.

[6] Dennis P. Bozeman and K. Michele Kacmar. 1997. A cybernetic model of impression management processes in organizations. *Organ. Behav. Hum. Decis. Process.* 69, 1 (1997), 9–30. DOI:https://doi.org/10.1006/obhd.1996.2669

[7] Dennis P Bozeman and K Michele Kacmar. 1997. A cybernetic model of impression management processes in organizations. *Organ. Behav. Hum. Decis. Process.* 69, 1 (1997), 9–30.

[8] Vannevar Bush and others. 1945. As we may think. *Atl. Mon.* 176, 1 (1945), 101–108.

[9] John T Cacioppo, Stephanie Cacioppo, Gian C Gonzaga, Elizabeth L Ogburn, and Tyler J Vanderweele. 2013. Marital satisfaction and break-ups differ across on-line and off-line meeting venues. *Proc. Natl. Acad. Sci.* 110, 25 (2013), 10135–10140. DOI:https://doi.org/10.1073/pnas.1222447110

[10] Michel De Certeau. 1984. *The practice of everyday life, trans.* University of California Press.

[11] B Jack Copeland. 2004. *The Essential Turing.* Clarendon Press.

[12] B Jack Copeland. 2010. *Colossus: The secrets of Bletchley Park's code-breaking computers.* OUP Oxford.

[13] Laurie E Damianos, Donna L Cuomo, and Stan Drozdetski. 2011. Handshake: a case study for exploring business networking for the enterprise, inside and out. In *International Conference on Online Communities and Social Computing,* 162–171.

[14] Mary Deane and Peter O'Neill. 2011. *Writing in the Disciplines.* Macmillan International Higher Education.

[15] Nicole Ellison, Rebecca Heino, and J. L. Gibbs. 2006. Managing impressions online: self-presentation processes in the online dating environment. *J. Comput. Commun.* 11, (2006), 415–441. DOI:https://doi.org/10.1111/j.1083-6101.2006.00020.x

[16] Douglas C Engelbart and William K English. 1968. A research center for augmenting human intellect. In *Proceedings of the Fall Joint Computer Conference (San Francisco, Calif., Dec. 9-11),* 395–410.

[17] Norman Fairclough. 1992. Discourse and text: Linguistic and intertextual analysis within discourse analysis. *Discourse Soc.* 3, 2 (1992), 193–217.

[18] Andrew T Fiore and Judith S Donath. 2004. Online Personals: An Overview. In *CHI'04 Extended Abstracts on Human Factors in …,* 1395–1398. DOI:https://doi.org/10.1145/985921.986073

[19] Jeaninne Horowitz Gassol. 2007. The effect of university culture and stakeholders' perceptions on university--

business linking activities. *J. Technol. Transf.* 32, 5 (2007), 489–507.

[20] Erving Goffman. 1978. *The Presentation of Self in Everyday Life.* New York, NY: Harmondsworth.

[21] Ido Guy, Inbal Ronen, and Eric Wilcox. 2009. Do you know?: recommending people to invite into your social network. In *Proceedings of the 14th international conference on Intelligent user interfaces*, 77–86.

[22] Ido Guy, Sigalit Ur, Inbal Ronen, Adam Perer, and Michal Jacovi. 2011. Do you want to know?: recommending strangers in the enterprise. In *Proceedings of the ACM 2011 conference on Computer supported cooperative work*, 285–294.

[23] Barbara Kamler and Pat Thomson. 2014. *Helping doctoral students write: Pedagogies for supervision.* Routledge.

[24] Henry Kautz, Bart Selman, and Mehul Shah. 1997. ReferralWeb: Combining social networks and collaborative filtering. *Commun. ACM* 40, 3 (1997), 63–66.

[25] Ralph Kimball and B Verplank E Harslem. 1982. Designing the Star user interface. *Byte* 7, 1982 (1982), 242–282.

[26] Jean Lave and Etienne Wenger. 1991. *Situated learning: Legitimate peripheral participation.* Cambridge university press.

[27] Barry M Leiner, Vinton G Cerf, David D Clark, Robert E Kahn, Leonard Kleinrock, Daniel C Lynch, Jon Postel, Larry G Roberts, and Stephen Wolff. 2009. A brief history of the Internet. *ACM SIGCOMM Comput. Commun. Rev.* 39, 5 (2009), 22–31.

[28] Henry Lieberman. 2008. A Creative Programming Environment. In *HCI Remixed.* Mit Press, 37–42.

[29] Ching-Yung Lin, Kate Ehrlich, Vicky Griffiths-Fisher, and Christopher Desforges. 2008. Smallblue: People mining for expertise search. *IEEE Multimed.* 15, 1 (2008), 78–84.

[30] Christopher M Mascaro, Rachel M Magee, and Sean P Goggins. 2012. Not just a wink and smile: an analysis of user-defined success in online dating. In *Proceedings of the 2012 iConference*, 200–206.

[31] Julia M Mayer, Starr Roxanne Hiltz, and Quentin Jones. 2015. Making social matching context-aware: Design concepts and open challenges. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*, 545–554.

[32] David W McDonald and Mark S Ackerman. 2000. Expertise recommender: a flexible recommendation system and architecture. In *Proceedings of the 2000 ACM conference on Computer supported cooperative work*, 231–240.

[33] Brad A Myers. 1998. A brief history of human computer interaction technology. *interactions* 5, 2 (1998), 44–54.

[34] Tim Reichling and Volker Wulf. 2009. Expert recommender systems in practice: evaluating semi-automatic profile generation. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 59–68.

[35] Andrew L Russell and Valerie Schafer. 2014. In the Shadow of ARPANET and Internet: Louis Pouzin and the Cyclades Network in the 1970s. *Technol. Cult.* 55, 4 (2014), 880–907.

[36] Rosemary Simpson, Allen Renear, Elli Mylonas, and Andries van Dam. 1996. 50 years after "As we may think": the Brown/MIT Vannevar Bush symposium. *interactions* 3, 2 (1996), 47–67.

[37] Anselm Strauss and Juliet M Corbin. 1990. *Basics of Qualitative Research: Grounded Theory Procedures and Techniques.* Sage Publications, Inc.

[38] Loren Terveen and David W McDonald. 2005. Social matching: A framework and research agenda. *ACM Trans. Comput. Interact.* 12, 3 (2005), 401–434.

[39] Clark Thompson. 1986. Military direction of academic CS research. *Commun. ACM* 29, 7 (1986), 583–585.

[40] Dylan Tweney. 2008. Dec. 9, 1968: The mother of all Demos. *Wired News* 12, 08 (2008).

[41] David Vise. 2007. The google story. *Strateg. Dir.* 23, 10 (2007).

[42] Jessica Vitak, Cliff Lampe, Rebecca Gray, and Nicole B Ellison. 2012. Why won't you be my Facebook friend?: Strategies for managing context collapse in the workplace. In *Proceedings of the 2012 iConference*, 555–557.

[43] Etienne Wenger. 1999. *Communities of practice: Learning, meaning, and identity.* Cambridge university press.

[44] Doug Zytko, Sukeshini A. Grandhi, and Quentin Jones. 2016. The coaches said...what?: Analysis of online dating strategies recommended by dating coaches. In *Proceedings of the International ACM SIGGROUP Conference on Supporting Group Work.* DOI:https://doi.org/10.1145/2957276.2957287

[45] Douglas Zytko, Sukeshini A. Grandhi, and Quentin Jones. 2014. Impression management struggles in online dating. In *Proceedings of the International ACM SIGGROUP Conference on Supporting Group Work.* DOI:https://doi.org/10.1145/2660398.2660410