

Comparing Privacy Attitudes of Knowledge Workers in the U.S. and India

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ABSTRACT

We compared privacy attitudes of knowledge workers from the U.S. and India who were involved in a collaborative software development project distributed across five sites of a multinational corporation. Prior studies on consumer privacy suggest that privacy concerns in India are lower than those in the U.S. While our work largely confirmed these findings, we found unexpectedly that knowledge workers in India expressed higher *interpersonal* privacy concerns compared with their U.S. colleagues. Our study points to a number of explanatory factors for the elevated privacy concerns in the Indian knowledge workplace: nature of interpersonal relationships, associations with privacy, competition among team members, management style and hierarchy, and differences in the physical characteristics of the workplace. Our findings highlight the challenges in satisfying privacy needs when individuals and teams collaborate with knowledge workers in India. An understanding of these issues is important for building and deploying systems for intercultural collaboration that can accommodate differences in privacy concerns.

Author Keywords

Privacy, Collaboration, Awareness, Knowledge Work, Workplace Layout

ACM Classification Keywords

H.5.3 Information Interfaces and Presentation: Group and Organization Interfaces—*Computer-supported cooperative work*

General Terms

Design, Human Factors, Management

INTRODUCTION

The past decade has witnessed a radical transformation in the scope and nature of collaboration among knowledge workers. Traditionally, people who worked together were always

co-located, and interacted face-to-face. Today, it is not uncommon for work teams to be distributed across different countries. Moreover, a significant portion of knowledge work is being shifted from North America and Europe to countries such as India, China, and the Philippines. Such transfers may involve setting up branches overseas and/or outsourcing work to firms located in those countries.

The resulting increased diversity in team composition and differences in workplace and cultural contexts can pose challenges to effective collaboration. In order to mitigate potentially negative impacts of these differences, it is first necessary that they be uncovered and understood. Often times, the problematic factors can be difficult to discover because they are taken for granted locally, while remote team members who have never visited the particular site may be completely oblivious to them.

We report on a study of such a geographically distributed project in a multinational corporation. The project team was distributed across four sites in the U.S. and one in India. The company in general, and the project in particular, were struggling with the effectiveness of their U.S.-India collaboration. As one solution for overcoming the challenges, upper management was contemplating the introduction of software tools and systems that facilitate greater awareness among team members of each other's activities, especially of those separated by distance. Yet, they were sensitive to the potential tension with privacy concerns that awareness systems typically engender [18]. To deploy these systems in a "privacy-sensitive" manner, it was deemed essential to understand how collaborators currently managed privacy, and which challenges and problems they encountered in reconciling privacy desires with the needs of awareness. It was also considered important to investigate how differences in the work contexts influenced these issues. Therefore, we decided to focus on understanding privacy management practices of the team members at the various project sites.

Toward this end, we conducted a qualitative study with a quantitative component, using non-participant observation, site visits, semi-structured interviews, and an online questionnaire as empirical methods [44]. Our initial fieldwork led to a framework that describes how privacy management operates in the context of collaborative work [43]. We also noted that the difference between the India site and each of the U.S. sites was far greater than that between any two U.S.

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sites. As a result, we decided to dig deeper into the differences between the privacy concerns of knowledge workers from the U.S. and India. To our surprise, that the differences in interpersonal privacy concerns were the opposite of those reported in the literature on consumer privacy. We draw upon our initial fieldwork to offer plausible explanations for these differences. These findings hold important implications for privacy-sensitive design as well as deployment of systems for supporting collaboration among globally distributed teams of knowledge workers.

PRIOR WORK

In the field of Computer Supported Collaborative Work (CSCW), initial findings related to privacy were primarily noted “on the side” in studies aimed at evaluating experiences with the awareness aspects of CSCW systems. For example, Palen [37] found that socio-technical mechanisms controlled privacy in network calendaring environments even when the calendars were highly open to others by default. Lee et al. [29] suggest that the mere existence of mechanisms to address privacy needs is not enough; these mechanisms also need to be lightweight. As Herbsleb et al. [14] discovered, the lack of lightweight privacy management mechanisms increased setup time. Moreover, Grinter and Palen [10] illustrate (albeit with teenagers) that users adapt system capabilities to achieve desired privacy goals. Additionally, Nardi et al. [35] noticed that plausible deniability of physical presence was used frequently by IM users as a means for privacy management.

Recently, studies of awareness systems have targeted privacy as the primary object of investigation. These studies unveiled a number of factors that affect users’ privacy judgments. These include: users’ relationship with the information recipient, the purpose and usage of requested information, the context, and the sensitivity of content [1, 2, 8, 27, 28, 36, 45]. Lederer et al. [27] also showed that a priori manual configuration of privacy preferences is better than automatic strategies, especially for information that users deem important. Patil and Kobsa [41] provide a more detailed discussion of these studies.

Most of the research mentioned above was conducted in North America and Europe. Recent proliferation of outsourcing has brought to attention knowledge work practices outside of these regions. However, the focus of research on outsourcing has typically been to advise Western corporations on the economics (e.g., cost/benefit analysis) and/or the logistics (e.g., lessons in cultural differences) of outsourcing (see e.g., Hendel et al. [13]). As a result, awareness and privacy needs in collaborative knowledge work in places like India are as yet underexplored.

As a starting point for understanding these issues, one may consult Hofstede’s [16, 17] cultural dimension scores. These dimensions have been shown to influence consumer privacy attitudes [5, 33]. Given that the scores for India are quite different compared with those for North America and Western Europe, one would expect privacy concerns in India to be different as well.

Indeed, a couple of recent studies revealed that Indians exhibited less awareness of, and concern about, privacy implications of new technologies when compared with Americans [7, 25]. Kumaraguru and Cranor [25] report “an overall lack of awareness of privacy issues and less concern about privacy in India than has been found in similar studies conducted in the United States.” Similarly, Cho et al. [7] found that privacy concerns were the highest in New York and the lowest in Bangalore. Furthermore, they discovered that Hofstede’s [16, 17] dimension of Individualism was one of the statistically significant predictors of privacy concerns; users from countries with a high Individualism score exhibited higher levels of concern about online privacy¹. The U.S. has a high Individualism score of 91 (compared with the world average of 43), whereas India scores only 48.

Based on this prior work, we expected similar results in the context of workplace collaboration. We anticipated that knowledge workers from India would voice lower privacy concerns than their colleagues in the U.S.

STUDY SETTING

We studied a software development project (henceforth Project X) in a large multinational telecommunications company. At various stages, Project X included anywhere between 80 to 130 contributors spread across five different locations: four in the U.S. (in three different time zones) and one in India. The software developed by Project X comprised eighteen interdependent modules integrated into a single release. Project X releases were scheduled in cycles of three to four months.

A variety of contributors worked on Project X: managers from different levels in the company hierarchy, software architects, systems engineers, software developers, testers, source code management (SCM) support staff, and internal and external customers. The number of people at each site varied from a handful to more than thirty. It should be noted that team membership² was independent of geographical location. It was not uncommon for members of a team to be distributed across different sites. In addition, a limited amount of telecommuting was common, but only in the U.S.

Project X required frequent intra-module as well as inter-module collaboration in all phases: design, architecture, coding, testing, integration, and maintenance. Collaboration was also required when the employees responsible for a module changed; the new individual(s) needed to be briefed. Collaborative activities that involved planning and coordination typically spanned the entire scope of the project. For example, management (from multiple managerial levels) worked together on planning project activities, tracking progress, making adjustments, and using estimates and forecasts to set future goals. Project X members used not only face-to-face meetings for collaboration but also a variety of communication, coordination, and awareness tools.

¹Other classifications, such as that by Ho & Chiu [15] also see the right to privacy as a key component of individualism.

²We define a team to be a group of individuals supervised by the same manager.

These included email, Instant Messaging (IM), shared calendars, Microsoft Project[®], telephones (desk phones as well as mobile phones), the SCM system, shared document repositories, and various Internet-based conferencing tools (such as Virtual Network Computing (VNC) or Microsoft NetMeeting[®]).

While most developers, testers and lower-level managers worked solely on Project X, other contributors were involved in (multiple) additional projects. The percentage of time that these individuals spent on Project X varied from merely 3-4% to more than 50%. Additionally, the time spent was also dependent on the current phase within a release. For instance, in some stages Systems Engineers worked nearly full-time on Project X while during the rest of the period, their effort could be an order of magnitude lower.

As the above description shows, Project X was diverse in terms of work sites, job functions, work practices, information systems, nature of dependencies, and so on. This diversity, in turn, meant that privacy needs and the practices for satisfying them would also likely be diverse, and hence allow us to capture these issues more broadly.

METHODOLOGY

Our research objective was to investigate privacy concerns in geographically distributed collaborative work. To avoid biasing the participants, we advertised the goal of the study as investigation of collaborative work practices. Given the lack of a universal definition for privacy, we also sought to avoid imposing a specific view of privacy. Therefore, instead of providing a definition of privacy, we asked the participants themselves what “privacy” meant to them in the context of their work and work practices. This enabled us to uncover the various contextual meanings of privacy for the participants, and the associated behaviors and practices aimed at satisfying privacy needs. An initial hour-long conversation with the Head of Project X helped us gain a basic understanding of the project and formulate a plan for conducting the study. Thereafter, we used the following methods:

- **Non-participant observation:** Our exploration started with non-participant observation of the meetings of the Project X management team, which involved managers from all project sites and all hierarchical levels. These meetings were mainly used to formulate the detailed plan for the next release cycle of the project. Our observations during the meetings improved our understanding of the organization and activities of the project, which in turn guided the development of the other phases and methods of the study that are described below.
- **Site visits:** During the first phase of the study, the researcher was based at a Project X site on the East Coast of the U.S., and visited three of the other sites, in mid-U.S., on the U.S. West Coast, and in India, for about a week each. At every site, interviews were conducted with project members (see below), and site-specific factors such as architecture, layout, work practices, and culture were documented. We also interviewed project contributors from the remaining U.S. site – located on the East

Coast – while they were visiting the first-mentioned site.

- **Semi-structured interviews:** At each visited site, we conducted semi-structured interviews lasting about 90 minutes. The questions were divided into three main themes: work practices, awareness and privacy needs, and desired enhancements to collaborative tools. In total, we interviewed fifty-two project members across the five sites. Interviewees at each site were chosen to achieve broad coverage across different job functions.
- **Online questionnaire:** Based on key insights from the above activities, we formulated an online questionnaire. It aimed at probing deeper into some of the aspects we learned from the earlier activities and at attaining broader coverage across Project X by reaching those whom we had not been able to interview. Additionally, we used questions from the literature to measure privacy attitudes and practices in the domain of consumer privacy [19, 51], and collected demographic data. The questionnaire was distributed to all individuals involved with Project X at that time (roughly 125). We obtained 90 valid responses (response rate 74%) which included responses from 30 of our original 52 interviewees.

For more details on our methodology, we refer the reader to Patil et al. [44]. In the present paper, we focus on the results of the questionnaire. Specifically, we utilize the questionnaire responses to compare the privacy concerns expressed by those at the U.S. and India sites respectively.

FINDINGS

In order to compare attitudes across the U.S. and India, we divided the questionnaire respondents into two groups: those who worked at the India site (India) and those who worked at any U.S. site (US). Group US consisted of individuals of various nationalities (including some Indian citizens). Since context external to work can affect privacy considerations [5, 19, 20, 21, 32, 52], we excluded from Group US those who had not lived in the U.S. for at least five years.³ For the same reason, we excluded from Group India those who had lived in the U.S. for longer than five years before returning to India. The final dataset comprised 52 individuals in Group US and 35 in Group India.

Consistent with the findings of prior research that consumer privacy concerns in India are lower, we found that Group India reported significantly lower engagement in practices for protecting the privacy of personal information from third parties ($p < 0.01$). These practices were reflected in the responses to the following yes/no questions taken from prior surveys from the domain of consumer privacy [19, 51]: a. Have you ever personally inquired about or looked to see whether a business or service you were thinking of using had any policies on how it would use the consumer information it collected [or not]?, b. Have you ever refused to give information to a business or company because you thought it was not really needed or was too personal?, c. Have you ever decided not to use or purchase something from a company

³Prior research suggests that five years is a reasonable length of time to assume acculturation to a host country [22].

Group	N		Mean		sd		Median		Mode		p
	US	India	US	India	US	India	US	India	US	India	
Team Local	52	35	3.35	4.51	1.77	1.84	3	5	4	6	0.0043
Team Remote	52	35	3.33	4.40	1.62	1.59	4	4	4	4	0.0031
Manager	52	35	3.40	4.43	1.85	1.69	3	5	1	5	0.0092
Project X Local	52	35	3.50	4.43	1.57	1.54	4	5	4	5	0.0077
Project X Remote	52	35	3.58	4.34	1.54	1.59	4	4	4	4	0.0287
Non-Project X Local	52	35	3.71	3.97	1.76	1.54	4	4	4	4	0.4695
Non-Project X Remote	52	35	3.67	4.11	1.76	1.49	4	4	4	4	0.2117
Upper Management	52	35	3.63	4.26	1.75	1.70	4	4	4	4	0.4656
Subordinates	38	28	4.53	4.46	1.96	1.60	5	5	5	5	0.8878
System Administrators	52	35	3.77	4.03	1.92	1.38	4	4	4	4	0.4656

Table 1. Levels of reported privacy concerns of Group US and Group India for various categories of people

because you weren't sure how they would use your personal information?, d. Have you ever asked a company to remove your name and address from any lists they use for marketing purposes?, e. Have you ever asked a company not to sell or give your name and address to another company?, and f. Have you ever asked a company to see what personal information, besides billing information, they had about you in their customer records?

During the interviews, we noted differential concerns for privacy for different types of colleagues. Therefore, we asked respondents to indicate privacy concerns with regard to various categories of work colleagues. We utilized the question from previous studies on privacy in Instant Messaging [40, 24, 42], tailored appropriately for Project X. As mentioned in the Methodology section, the question was phrased in a way that did not impose a definition of privacy: "Please indicate how concerned you are regarding your privacy when dealing with the following groups of people on a scale of 1 (completely unconcerned) to 7 (extremely concerned). ("Privacy" is a broad concept that can encompass a variety of concerns including but not limited to confidentiality, availability to others, sharing of one's location and activities, disclosure of personal information, non-work life etc. In any situation, different individuals may characterize privacy differently. Please use YOUR characterization in the answers below.)" The groups we provided were: a. team members at the local site (excluding the manager), b. team members at remote sites (excluding the manager), c. manager, d. Project X peers outside of one's team at the local site, e. Project X peers outside of one's team at remote sites, f. upper management, g. company employees at the local site (but not working on Project X), h. company employees at remote sites (but not working on Project X), i. subordinates (if applicable), and j. system and IT administrators and support staff. Counter to our expectations (see Section), and in contrast to the consumer privacy findings above, individuals in Group India expressed higher *interpersonal* privacy concerns than those in Group US.

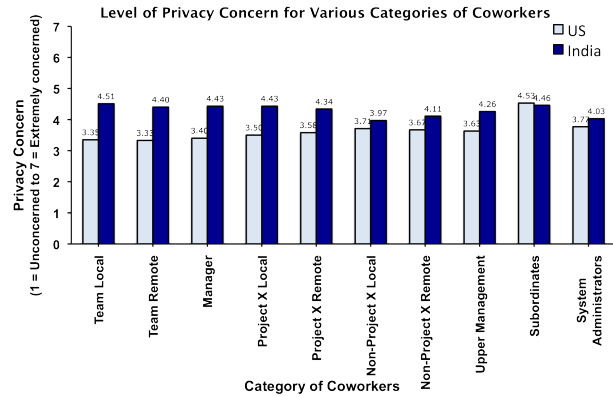


Figure 1. Average reported privacy concerns of Group US and Group India for various categories of collaborators on a scale of 1 (unconcerned) to 7 (extremely concerned)

Figure 1 plots the reported privacy concerns of the two groups for each category, and Table 1 presents descriptive statistics. Overall, Cronbach's alpha for the privacy concern items is 0.95. Cronbach's alpha for each of the two groups is also high (India: 0.94, US: 0.96) indicating high internal consistency. Pairwise t-tests for the differences are significant for those categories of contacts with whom one typically works closely, viz., local and remote team members, manager, and local and remote Project X members. Although the differences for the other categories are not statistically significant, the privacy concerns of Group India are still higher except in the case of subordinates.

In a similar vein, on a scale of 1 (strongly disagree) to 7 (strongly agree), those from Group India indicated a higher desire for privacy management tools ("Tools that help me better manage my privacy with respect to others would be useful to me." – India: 5.1 and US: 4.27, $p < 0.033$).

Interestingly, we found that the interpersonal privacy concerns expressed by both Group India and Group US were related to the extent to which the individuals were gener-

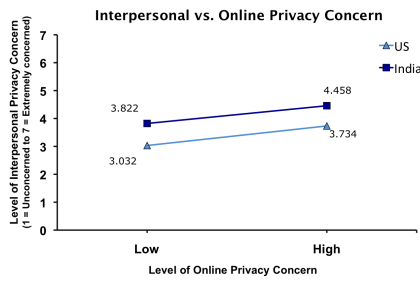


Figure 2. Interpersonal privacy concern for different levels of online privacy concern

Online Privacy Concern	US	India
High	38 (73%)	10 (30%)
Low	14 (27%)	25 (70%)

Table 2. Number of respondents in Group India and Group US by level of online privacy concern

ally concerned about privacy on the Internet. To gauge the level of general Internet privacy concern, we used a question borrowed from prior consumer privacy surveys [19, 51]: How concerned are you about threats to your personal privacy when you are online? (1 = Very, 2 = Somewhat, 3 = Not very, and 4 = Not at all). We pooled the respondents concerned at levels 1 or 2 into a high online privacy concern group, and those concerned at levels 3 and 4 into a low concern group. We also calculated a single level of interpersonal privacy concern for every respondent by averaging across the various groups listed in Table 1. As can be seen in Figure 2, this aggregated interpersonal privacy concern increases with increased online privacy concern, for both groups. The correlation is statistically significant for Group US ($r = 0.4$, $p < 0.005$) but not for Group India ($r = 0.18$, $p < 0.3$). We suspect that the latter is due to the relatively small number of respondents in Group India with high online privacy concerns. Only 30% ($N=10$) of the respondents in Group India expressed high online privacy concerns as opposed to nearly 75% ($N = 38$) in Group US (see Table 2).

In fact, the relative percentages of those with high and low online privacy in Group India and Group US are almost opposite of each other (see Table 2). Combining this observation with the relationship between online and interpersonal privacy concerns discussed above, we sought to refine the differences observed in Figure 1 by further splitting Group India and Group US into two subgroups: one with low and one with high online privacy concerns. Figure 3 compares the magnitude of the difference in reported privacy concerns for the various categories among the subgroups with low and high online privacy concerns.

It can be seen in Figure 3 that the differences are higher when those with low online privacy concerns from Group India are compared with those with similar (low) online privacy concerns from Group US., and smaller when the two subgroups with high online privacy concerns are compared. The large proportion of Indians with low Internet privacy concerns therefore contributed considerably to the observed differences in interpersonal privacy concerns. This is note-

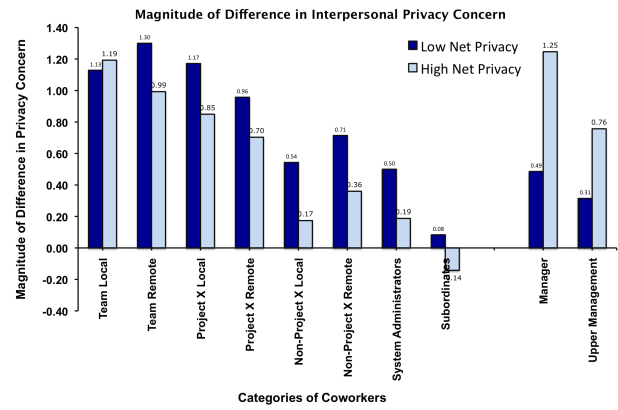


Figure 3. Magnitude of the difference in interpersonal privacy concerns among subgroups with low vs. high online privacy concern

worthy given that prior research [25, 7] suggests that the relative percentages of those with low and high online privacy concerns in India and the U.S. populations may be similar to those in our sample.

There are two notable exceptions: team members at local sites (as seen in Figure 3 at extreme left) and management (as seen in Figure 3 at extreme right). The former shows relatively little change across subgroups. This suggests that the social, collaborative, and physical proximity with local team members may ameliorate the impacts of differences in online privacy concern. As far as management is concerned, the results of the comparison are opposite to that in the other cases. This could be due to differences in the management style and in attitudes towards management in India and the U.S. (see the discussion in the following section).

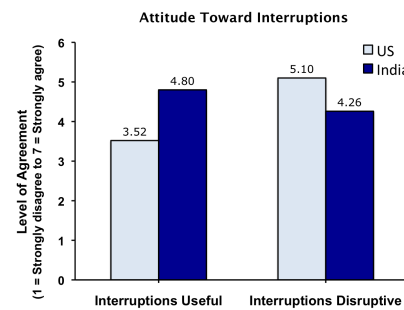


Figure 4. Attitudes toward interruptions at the U.S. and India sites

We also compared the reported attitude of the two groups towards interruptions, a factor frequently linked to privacy [3]. As Figure 4 shows, despite expressing comparatively higher privacy concerns Group India finds interruptions useful to a much larger extent than Group US (“I find interruptions useful (e.g. to handle urgent issues, to catch up with colleagues, to take a break etc.)” – India: 4.80, US: 3.52, $p < 0.00001$). On the other hand, despite expressing comparatively lower privacy concerns, Group US finds interruptions disruptive to a much larger extent (“Interruptions disrupt my workflow

and decrease my productivity.” – India: 4.26 US: 5.10 $p < 0.015$).

PLAUSIBLE EXPLANATIONS

To uncover plausible explanations for the surprisingly higher privacy concerns of Group India, we took a closer look at the data from our questionnaire, interviews, and field visits. As mentioned in the Methodology section, the questionnaire itself was based on insights from prior research. We further attempted to relate our prior observations and findings regarding the privacy management process [43, 39] with the attitudes expressed in the questionnaire responses. Based on this analysis, we believe that one or more of the following factors account for the observed discrepancy.

Nature of Interpersonal Relationships

Culturally, interpersonal relationships play an important role in Indian society [34]. As a result, Indians are likely to spend more time and effort managing these relationships. In contrast, privacy-preserving actions in the consumer domain involve impersonal third parties and organizations and may not be treated with the same priority as interpersonal privacy management. We also found that, on a scale of 1 to 7, Group India expressed a slightly greater desire than Group US to know how others perceive them based on their interpersonal interactions (“I would like to know how others perceive me based on my interactions with them.” – India: 6.03, US: 5.44, $p < 0.05$). Such desire for relationship-appropriate impression management has been shown to be an antecedent of privacy concerns [24].

This is evident in Table 1 which shows larger, statistically significant differences in privacy concerns for the categories of collaborators with close working relationships (viz., Team Local, Team Remote, Manager, Project X Local, and Project X Remote). Subordinates seem to be an exception, perhaps because, as indicated in our interviews, managers wished to protect the privacy of their staff members from other employees and also desired confidentiality of sensitive managerial communication from subordinates.

Associations with Privacy

The Western perspective suggests an association between privacy and interruptions, with lower levels of interruptions providing higher levels of privacy. In Warren and Brandeis’ seminal treatise, privacy was even defined as “the right to be left alone” [50]. Yet, as mentioned above, the opinions of Group India regarding the usefulness and disruptiveness of interruptions run counter to their reported higher concerns about privacy. A different attitude towards interruptions suggests that what is, and is not, associated with the concept of privacy by the two groups may not always match. Therefore, some of the differences in privacy attitudes between Group US and Group India may stem from a lack of complete alignment of privacy associations.

Intra-team Competition

In India, the job market for knowledge workers (particularly in IT) is extremely competitive. Individuals constantly seek better work prospects both within and outside the company.

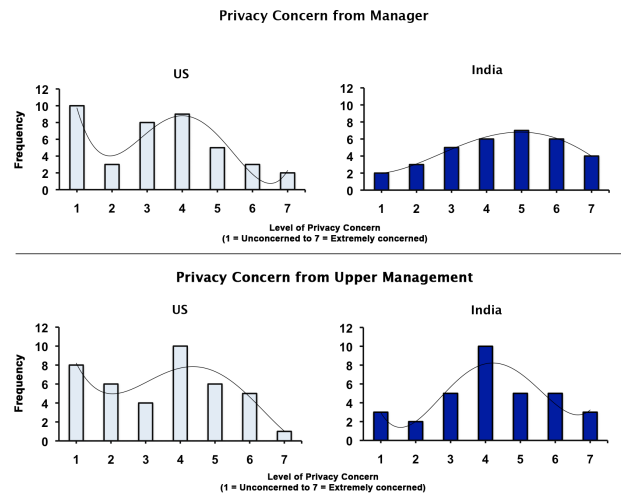


Figure 5. Privacy concerns from management

As a result, one is always competing with others for “credit” and “experience.” Prior research showed that concerns regarding losing credit (and money) for innovative ideas leads individuals to seek information from sources external to one’s organization rather than from colleagues within the company [31]. Indeed, Group India rated the competition within their teams to be higher than Group US (“The culture of my team tends to be competitive.” – India: 3.46, US: 3.00, $p < 0.03$). Competing with one’s team members would likely elevate one’s desire for privacy from them and lead to selective information disclosure and sharing.

Management Style and Hierarchy

The findings section hinted that privacy concerns toward management may be somewhat different than those toward other colleagues. During our field visits and interviews we also observed that the management style at the India site differed from that at the U.S. sites. For instance, individuals in India required more managerial “hand holding,” in terms of coaching and decision-making. Moreover, communication with individuals at the U.S. sites was frequently channeled through management. In contrast, those at the U.S. sites reported working more independently and exercising greater discretion and autonomy in routine matters.

Hofstede’s [16, 17] cultural dimensions point to differences between India and the U.S. in terms of hierarchical relationships. The dimension of Power Distance is a measure of “the extent to which the less powerful members of organizations and institutions (like the family) accept and expect that power is distributed unequally” [16, 17]. Compared with the world average value of 55, the Power Distance Index for India is much higher (77) while that for the U.S. is on the low end (40). Higher values of power distance are associated with greater inequality in power relations such as between management and staff. Literature on Indian organizations shows that superior-subordinate relationships are hierarchical, with an emphasis on superior guidance and subordinate loyalty and compliance [23, 30, 38, 46, 47]. Similarly, Ayman et al. [4] found that Indian managers scored high on pa-

ternalism, power distance and uncertainty avoidance. This results in “a dependent relationship between superiors and subordinates in which managers tend to assume lower employee proactivity and, consequently, do not promote employee autonomy on the job” [4]. Also, a presumed lack of employees’ reactivity leads managers to prescribe goals and plans at a low level of detail because they believe that employees need direction and close supervision.

We therefore took a closer look at the privacy concerns of Group India and Group US in relation to their managers and their upper management. We filtered out the responses from managers from both groups, leaving us with 33 non-managerial respondents for Group India and 40 for Group US. We then plotted the frequency distributions of these groups for the level of privacy concern regarding their managers and upper management. Figure 5 shows that Group US is slightly skewed toward the lower end and Group India toward the higher end. The higher Power Distance Index for India leads one to expect acceptance of the hierarchical power relations from subordinates. This acceptance further leads to a general alignment in subordinate attitudes toward management. This can be seen in the questionnaire responses; Group India shows less variance regarding privacy from management than Group US (see Table 1).

Physical Characteristics of the Workplace

To understand the factors underlying our findings, we also took into account the physical context in which collaborative work is embedded. Prior research shows that the physical characteristics of the workplace play a role in employee attitudes and work practices. Stokols et al. [48] found that environmental distraction was significantly linked to employee perceptions of support for creativity at work, which in turn affected job satisfaction and stress. Regarding privacy in particular, Sundstrom et al. [49] discovered that privacy ratings of the workplace increased with the number of partitions. Kupritz [26] further analyzed the relationship between various physical workspace features and several work activities that required privacy.

During our site visits we noticed that the physical characteristics of the India site were substantially different from any of the U.S. sites. The site in India was densely packed compared to the sites in the U.S. (see Table 3 for a comparison of the area and density of the India site with the U.S. grand average). The top two pictures in Figure 6 contrast cubicles at the India site on the left with those at one of the U.S. sites on the right. The bottom right picture in Figure 6 highlights the spacious, uncrowded common areas at the U.S. sites in contrast to the densely-packed India site.

Moreover, as the left half of Figure 6 shows, the India site was arranged as a dense cubicle farm with dividers rising barely higher than the average sitting height of a person. The low height of the cubicle dividers caused individuals’ computer screens to be visible to a large number of people at any given time. It was not uncommon for as many as five employees to share a cubicle. Sometimes even managers were assigned a cubicle shared with, or next to, those they super-



Figure 6. Physical layouts of the Indian site (top) compared with those at the U.S. sites (bottom)

	India	US
Employees	621	2,319
Area including common spaces (sq. feet)	89,157	973,142
Density (sq. feet / employee)	144	419

Table 3. Employee density at the Indian and the U.S. sites

vised. Upper management did receive the privilege of a private cabin. However, these cabins were made of transparent glass. As a result, it was extremely difficult, if not impossible, to carry out physical or digital actions in seclusion.

In contrast, all employees at two of the three U.S. sites we visited occupied office rooms, either by themselves or shared with one other person. The middle right picture in Figure 6 shows a corridor of such offices with a view into an office. Employees at the third location occupied cubicles, again by themselves or shared with one other person. However, as shown in the top right of Figure 6, these cubicles were much larger (with dividers reaching almost up to the ceiling) than those at the India site and were equipped with doors.

Prior studies confirmed the impact of “open-plan” offices on privacy. Haans et al. [11] reported that Dutch bank employees working in such an office with little visual and auditory separation between work spaces indicated a higher need for privacy than those working in a mixed office design. Additionally, “employees who had to share their desk with others had an even higher need for privacy in open-plan offices” [11]. Birnholtz et al. [6] offer insight on how workers in North American open-plan offices cope by lowering their privacy expectations and drawing upon shared understanding of “legitimate targets of attention” in the physical space. A literature review by De Croon et al. [9] provides strong evidence that working in open workplaces reduces privacy and

job satisfaction. There is also some evidence that open-plan and densely packed workplaces increase cognitive workload, decrease the quality of interpersonal interactions and reduce privacy [9]. Thus, we believe that the difference in workplace layout is one of the factors underlying the elevated privacy concerns expressed by Group India.

IMPLICATIONS

Our findings underscore the need for designers to take into account the diversity of cultural contexts in which the systems that support global collaboration are expected to operate. Designers ought to devise systems that can be adapted to these factors, both at the time of deployment and “on-the-fly” by end-users. Some possible avenues include:

- Expanding the scope of localization, such that the default preferences that affect privacy can be altered for each location of deployment (the defaults could, for instance, be based on international privacy surveys such as [21]).
- Providing the ability to switch between a “private” mode of operation and a “public” mode that accommodates for the presence of others around one’s computer screen [12]. Such modes would be beneficial not just in dense work environments but also in situations that involve synchronous group work (e.g., team meetings, pair programming, etc.)
- Providing interaction mechanisms for better management of the information displayed on one’s computer screen. For example, mechanisms that allow one to arrange, move, hide, and obfuscate on-screen information with little effort can be helpful in dealing with changes in the physical context surrounding one’s work area.

In addition, designers need to keep in mind that the physical environments in which these systems are deployed may be vastly different and may influence how the systems are used in practice. Moreover, organizations ought to pay attention to the architecture as well as the physical arrangement of their workplaces, in order to increase the effectiveness with which employees can meet their privacy needs. While this is easier to achieve when designing new work sites, major architectural changes to existing sites may be infeasible or impractical. In such cases, improvements could still be achieved with relatively easy and low-cost rearrangements such as seating and desk configurations in which computer screens face away from potential onlookers. In dense work environments, it may also be useful to equip each computer monitor with a privacy screen that restricts side-angle views. Dense work environments could also benefit from the provision of a few designated “privacy zones” available for use by individuals and/or groups when seclusion is necessary.

During our fieldwork we discovered it was often difficult for individuals to empathize and develop an accurate understanding of the situation and circumstances at remote sites that they had never visited. This difficulty had a particularly acute impact on U.S.-India interactions. Similarly, team members reported that seeing someone face-to-face, even once, resulted in a positive impact on subsequent collaboration. These observations suggest that distributed projects

may benefit from a face-to-face “ice-breaker” as well as at least one visit to every other site. Unfortunately, conducting such ice-breakers and site visits is often riddled with logistical and financial hurdles. A compromise might be to appoint a “liaison” at each site. Each liaison would need to have visited all of the project sites and met face-to-face with all team members. The liaisons could then act as bridges for inter-site communication and collaboration, and promote greater inter-site empathy and understanding.

LIMITATIONS AND FUTURE WORK

This work reports on knowledge workers from a single corporation. Similar studies need to be conducted in other organizations to verify the applicability of our findings to different types of knowledge work. As far as the generalizability to other *Indian* companies is concerned, informal consultations with several Indian knowledge workers from other firms suggest that our experience might be typical of most knowledge workplaces in India. Therefore, we believe that our results apply more broadly beyond the firm we analyzed. Future studies are needed to investigate and compare across work sites of different organizations.

CONCLUSION

We found differences in the privacy concerns of knowledge work collaborators in the U.S. and India. Our study indicates that the differences can be explained by a host of physical and social contextual factors: nature of interpersonal relationships, associations with privacy, intra-team competition, management style and hierarchy, and physical characteristics of the workplace. We believe that these findings apply more broadly because these factors appear to be common to a majority of Indian firms engaged in knowledge work. Design improvements in collaboration-support systems as well as physical re-arrangement of the work environment could help mitigate the impact of some of these differences. These findings also highlight that systems designed for supporting globally distributed collaboration need to accommodate interactions between knowledge workers with diverse preferences and practices. We hope that this work will pave the way for future research on knowledge work practices in India and other understudied international settings.

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