CHAPTER **11**

# Communication and Collaboration

written in collaboration with Nicholas Diakopoulos

66 Coming together is a beginning, staying together is progress, and working together is success. 99

**Henry Ford**

66 Drop the 'The.' Just 'Facebook.' It's cleaner. 99

**Justin Timberlake as Sean Parker**
*The Social Network,* 2010

## CHAPTER OUTLINE

# 11.1 Introduction

Constant and immediate communication and interaction with family, friends, collaborators, colleagues, coworkers, and even pets are now commonplace in the increasingly networked world. Communication and collaboration systems are re-making entire swaths of how lives are lived, including how people do work, find romance, exchange and deliberate policy, engage in civic participation, produce software and other creative wares, play and entertain themselves, shop for and select products and services, find support when they are in ill health, gain an education, and receive and produce information (Rainie and Wellman, 2012). The intrinsically motivating role of interpersonal connectedness (Deci and Flaste, 1995) drives human beings to want to communicate and interact with others across the full range of experiences.

Originally launched as a microblogging platform in 2006 for people to post short, 140-character text messages about what they are doing, Twitter allows users to subscribe to each other's feeds, forming a "publish and subscribe" social network. In the 10 years since its launch, the platform has become an important way for people to share information, find experts, surface breaking news photos and videos, coordinate efforts during natural disaster responses, and maintain an awareness of the pulse and reactions of those on the network (Vieweg et al., 2010; Diakopoulos et al., 2012). It's reshaping how news and information are disseminated, moving away from a traditional gatekeeping model where professional editors had ultimate control over what was published or promoted to a system in which social activity, personal connections, and algorithmic ranking are just as important. Facebook is another major social network site (boyd and Ellison, 2007) and in 2015 had close to 1.5 billion global users who log on at least once a month. Facebook is similarly changing the information production and consumption landscape and has also been shown to have substantial benefits for individuals' relationships. People often join Facebook in order to keep up with friends or to solidify relationships with acquaintances like dormmates, classmates, and work colleagues. Early research has shown that Facebook helps people build social capital—the resources available to an individual as a result of having a durable network of relationships (Ellison et al., 2007). While Facebook and Twitter are dominant in the United States, other social network sites and chat platforms are flourishing elsewhere around the world, such as Weibo and Renren in China, VKontakte in Russia, and Kakao Talk in South Korea. Such platforms allow users to easily and cheaply maintain connections and crystallize relationships. The positive outcomes from such platforms are wide-ranging, from job seekers hoping for support or a lead on a new job (Burke and Kraut, 2013) to citizens seeking to organize a political protest to fight oppression. Social

network sites can even enable positive public health outcomes such as contributing to smoking cessation programs by providing social support (Phua, 2013).

But it's also important for designers to consider and account for the downsides and negative exigencies of such systems. Criminals, terrorist recruiters, and oppressive political leaders can use social network sites for negative purposes. A miscreant can bully or deceive others online, and hate groups can spew their propaganda. Some may become addicted to communication tools or waste time that could be more productive, while others will inadvertently share photos or other information that damages their reputation and is difficult to remove from their online profile. Social media can make behaviors such as stalking and public shaming easier (Ronson, 2015). Trusting or naïve children and adolescents may become targets of predatory adults seeking underage sexual relationships. Ideas can become polarized when liberal and conservative thinkers cluster together based on homophily and pay less attention across the philosophical divide. Sherry Turkle has been critical of the role that mobile communication technologies play in distracting people from fully participating in real-life conversation (Turkle, 2015). Important questions for society to consider are how new forms of communication change the way people think, build relationships and community, and practice political organization. Designers must be aware of such behaviors and possible outcomes and consider design options that circumvent or mitigate the worst possibilities. Good design, effective community leadership, and thoughtful governance policies and strategies can lead to more positive social outcomes.

Despite their huge popularity, social network sites are just one particular form of online communication. A Pew survey of Americans in 2014 found that four of the five top uses of smartphones were communication applications with modalities including text messaging, voice or video calls, e-mail, and social networking (Smith and Page, 2015). Different communication channels and tools are more or less suited for different tasks and human needs, whether they be chatting with a friend or coworker, writing a collaborative document with someone, posting to a discussion forum or Q/A site, participating in group project management, coordinating a real-world community gathering like a meetup, sharing files, or teleconferencing, among others. The academic field that emerged in the 1980s to study technology used by two or more people is called computer-supported cooperative work (CSCW), though 30 years later the field has also adopted *social computing* as an umbrella term that implies less of a strict devotion to collaboration and work per se and includes cooperation, collaboration, and competition as well as non-work activities like gaming and romance.

The communication and collaboration tools that designers create shape the ability to work and accomplish shared goals with one another. The degree of interactivity, the social cues present in the interface, and the mobility of

communication technologies are but a few of the design dimensions that affect use in different contexts (Baym, 2015). Design is just a starting point for behavior, though, and often people will quickly repurpose communication technologies to accommodate their specific needs. On Twitter, the need to re-share information while attributing it to the original source (a social norm) led to linguistic innovations like *via*, *retweeting*, and *R/T* before ultimately catching on as *RT* a compressed version of *retweet* that took up minimal space within the 140 characters allowed in a message (Kooti et al., 2012). Years later, Twitter formalized this convention by building the ability to retweet a message directly into the platform. The social shaping of technology perspective reflects the idea that the tools that designers craft do not precisely determine how people will use them but rather interact with human goals as the technology co-evolves: "The consequences of technologies arise from a mix of 'affordances'—the social capabilities technological qualities enable—and the unexpected and emergent ways that people make use of those affordances" (Baym, 2015). Interface and experience design must be an iterative and constantly evolving endeavor as people and technology co-evolve.

Research in collaboration and communication interfaces is often more complex than in single-user interfaces. The multiplicity of users makes it difficult to conduct experiments that control for group variability. Differences in physical distribution of participants can make the application of some research methods considerably more arduous. Studies of small-group psychology, industrial and organizational behavior, sociology, and anthropology can provide useful research paradigms (Lofland and Lofland, 2005). Content analysis methods can be used to analyze and create typologies of the types of messages that individuals post, leading to insights not only about content but also about the relationships between individuals (Riffe et al., 2013). Also, as questions of macro-HCI are considered (see Chapter 3), studying communication platforms at scale requires that methods in data science be adapted. Communication texts, including chat logs, tweets, Facebook posts, and online comments can be analyzed using natural language processing (NLP) algorithms. These methods are useful for identifying, counting, or scoring texts (Diakopoulos, 2015), such as according to positive or negative sentiments expressed. Text analysis can also be combined with structural understanding using methods from social network analysis (Hansen et al., 2011; Leetaru, 2011). For example, topical network maps have elucidated structures among online Twitter groups like polarized crowds, tight crowds, brand clusters, community clusters, and broadcast or support networks (see Fig. 11.1). Such methods allow better understanding of how individuals organize and communicate online, elucidating structures and strategic locations or roles within the network (Smith et al., 2014).

Questions of ethics become paramount when studying open communication networks as people may share sensitive personal information without realizing
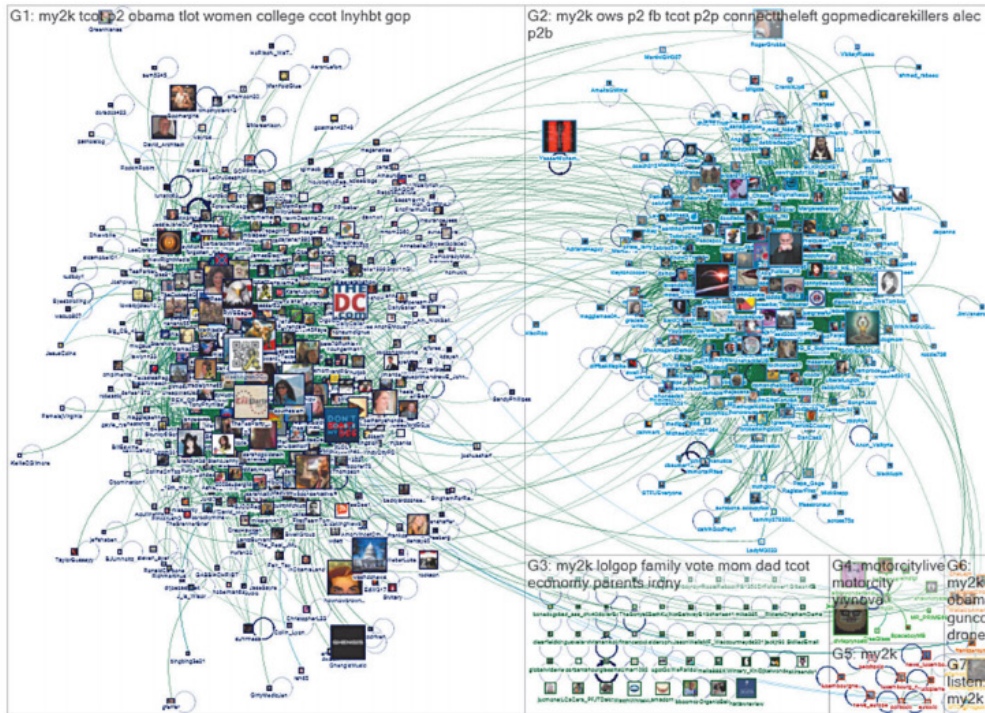
**FIGURE 11.1**

A network map made with NodeXL software shows the polarized nature of the conversation on Twitter around the #My2k hashtag that emerged over U.S. budget struggles in 2012.

that a researcher might scoop it up and analyze it for other purposes. Researchers must carefully consider whether they should anonymize names and remove other identifying information from subsequent published analyses (Bruckman et al., 2015) as well as more generally consider the risks and benefits of such research. A Facebook study indicating that users' emotional state could be modulated based on the positive or negative sentiments they were exposed to in their newsfeed (Kramer et al., 2014) resulted in widespread questioning of the ethics of such experimental manipulations. A survey of researchers who use online data found consensus around several ethical guidelines, including notifying participants about why data is being collected, sharing research results with participants, removing individuals from datasets upon their request, and being cautious when sharing results with identifiable outliers (Vitak et al., 2016). Studying others' platforms leads to additional challenges like a lack of control of the interface and an inability to know how the platform may be shifting or dynamic due to A/B tests (see Chapter 5.3.4). One way to overcome some of these issues is to build proprietary social software and

develop a user base that is genuinely motivated to inhabit that online space. This approach is difficult but has been successful for projects like GroupLens at the University of Minnesota, which has been able to run large-scale studies of recommender systems and other online communities in this fashion.

The following section (Section 11.2) presents a model to help orient readers within the design space. In Section 11.3, different collaboration and communication goals and contexts are presented to illustrate how design can adapt to support different user needs. And finally, in Section 11.4, several design considerations and challenges related to communication and collaboration technology are articulated.

## 11.2 Models of Collaboration

Consider a typical day for a digital native: Wake up and check social networking accounts to get the latest news, go to work and collaboratively edit a report, chat with an office colleague about the new intern, post a question to a Q/A site about a statistical test needed to complete the report, then on the way out of the office text message a significant other to coordinate dinner plans, and after dinner receive a crowd-based recommendation for a movie to watch. Each of these activities hinges on communication—a process in which information is exchanged between individuals—if not active collaboration involving achieving or doing something with those individuals. Yet the wide variety of types of communication and collaboration raises the question of how to make sense of the design space. Which of these daily activities is more similar and more different from a design point of view? A descriptive model or framework for design can help start putting this into perspective and provide the ability to recognize, compare, and discuss the features and demands of various design contexts.

The traditional way to decompose collaborative interfaces is by using the time/space matrix, which has four quadrants: same time, same place (e.g., shared table display, wall display); same time, different place (e.g., teleconferencing); different time, same place (e.g., public display); and different time, different place (e.g., e-mail, discussion forums, version control). The terms *synchronous* (same time), *asynchronous* (different time), *co-located* (same place), and *remote* (different place) are often used. Certainly time and space are both important dimensions to consider when designing such collaboration tools, but the binary nature of the matrix is somewhat of an oversimplification. In terms of time, for instance, modern communication tools like Slack or Facebook blur the line between asynchronous messaging and synchronous chat and are not distinctly asynchronous or synchronous.

A more contemporary framework that operates at the mezzo and macro level is the Model of Coordinated Action (MoCA), which incorporates the traditional model but expands it into a set of seven dimensions and shifts toward a deeper understanding of "coordinated action" in order to encompass goal-directed activities that are not traditionally considered to be work (Lee and Paine, 2015). Lee and Paine define coordinated action as the "interdependence of two or more actors who, in their individual activities, are *working towards a particular goal through one or more overlapping fields of action*." This definition accounts for situations where participants may be collaborating in a diffuse or even indirect way, such as crowdsourcing or collaborative recommendation engines. A "field of action" need not be the same for all collaborators as they take on different tasks in order to accomplish some greater goal. The seven dimensions, described in detail next and shown in Fig. 11.2 are synchronicity, physical distribution, scale, number of communities of practice, nascence, planned permanence, and turnover. In some cases, these dimensions will reflect on the design of the communication tool or platform, but just as often, the nature, qualities, and intents of the people involved in the coordinated actions play just as large a role in achieving a successful outcome. Universal designs for collaboration and communication systems fluidly accommodate users across the spectrum of these dimensions.
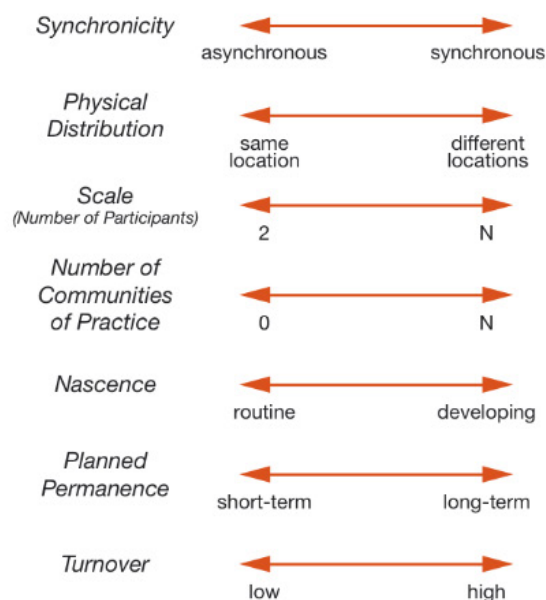


**FIGURE 11.2**

The seven dimensions of the MoCA model (Lee and Paine, 2015).

## 11.2.1 Synchronicity

Coordinated actions can take place along a spectrum of synchronicity, ranging from actions that are entirely asynchronous to those that are entirely synchronous. Importantly, this dimension allows for actions to be a mixture of synchronous and asynchronous rather than enforcing a distinct boundary between extremes. In ongoing work processes, a larger context of asynchronous interaction often embeds episodic synchronous activity (Olson and Olson, 2000). Examples of more synchronous communication channels include voice or video conferencing (e.g., Skype), whereas more asynchronous channels include things like messaging systems or Q/A forums (e.g., iMessage and Stack Overflow, respectively). The degree of synchronicity of a channel (i.e., the delay between turns) can also be a function of its context of use or social expectations. Imagine users in a chat session on their phones, happily exchanging messages in a near-synchronous fashion when one chat partner introduces a large delay into the next response. Maybe the partner got distracted, or his or her attention otherwise shifted and was reprioritized, but the result is that the chat went from being more synchronous to more asynchronous.

Newer project management tools reflect the idea that collaborations often require a mixture of asynchronous and synchronous communication and allow users options within that range. Google Docs is a writing program that allows collaborators to co-write texts. It allows different users to write asynchronously across different time zones or work shifts as well as allowing for real-time editing by multiple users. Moreover, for situations where there is a need to work concurrently and resolve questions, there is chat functionality built in so that collaborators can exchange messages and discuss any edits they may need to make (see Fig. 11.3).

## 11.2.2 Physical distribution

Teams working together can exist along a continuum ranging from being at the same shared desk to the same room, building, campus, city, country, continent, or planet. A collaboration can thus be more or less physically distributed. Despite all of the internet communication channels available to users, the actual physical distribution of collaborators still matters (Olson and Olson, 2000). Physical presence can afford unplanned interactions and rapport building that are unavailable through other channels—sometimes the trust built over such "watercooler" talk is essential to project success or resilience.

Physical location can be a proxy for cultural differences that might include expectations for things like pauses in conversation or who has permission to speak when and to whom (Olson and Olson, 2013). Different countries may have different holiday schedules or work hours. For instance, in parts of the Middle East, Sunday is a work day, whereas in the United States it is not. Time zones can make
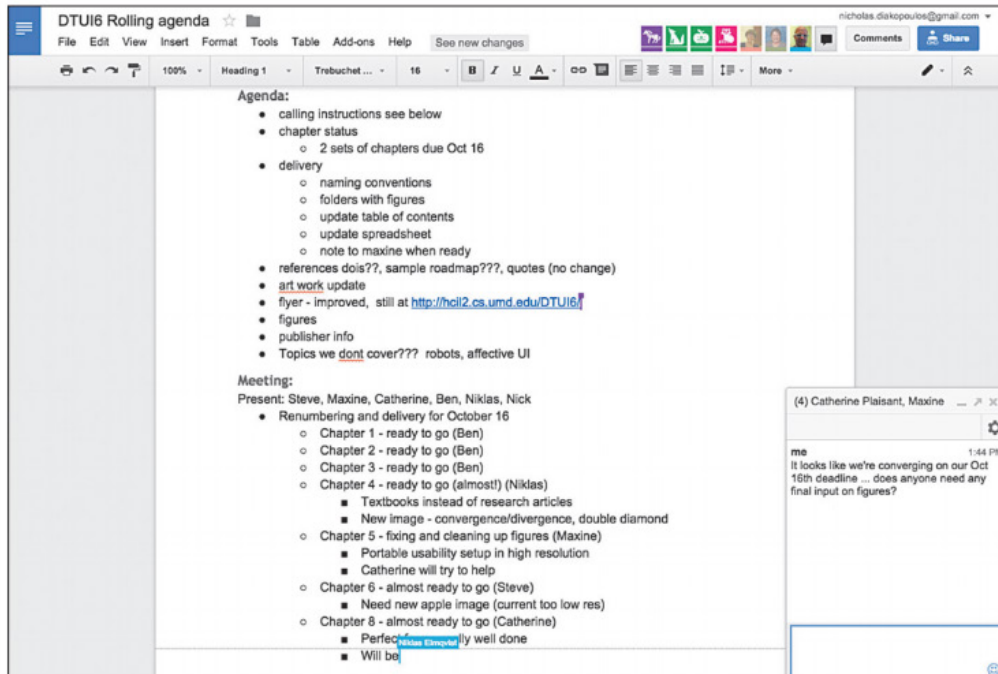
**FIGURE 11.3**

The Google Docs interface showing how multiple users can simultaneously edit a document. Note that colored flags for different users offer concrete feedback that signals who is editing a particular part of the document. In the lower right corner, a chat box invites users to synchronously converse with each other around the document.

it difficult to schedule synchronous communications that are convenient to all parties: a 5 p.m. call in Norway is an 8 a.m. call in California, at the extremes of the work day and probably not terribly convenient for either party. Who on the team deserves to be *more* inconvenienced in case a common time cannot be found?

## 11.2.3 Scale

The number of participants involved, or the scale of the collaboration, is an important dimension that affects the nature and type of interactions that emerge. The difference is substantial between co-writing a paper with one other person and contributing to a Wikipedia article with 10 or 100 others. In smaller collaborations, each person might know everyone else by name, whereas in much larger-scale collective actions, there may in fact be little direct contact between individuals. Many users may remain in lightweight contact as occasional lurkers or provide fine-grained contributions like voting or tagging. Wikipedia manages what is often a large scale of contributions from different users by allowing for a range of granularities of contributions, anywhere from fixing spelling or
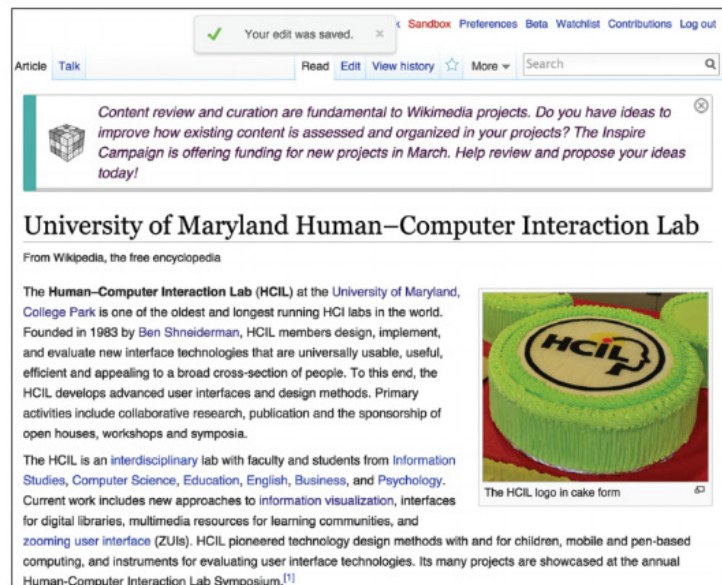
**FIGURE 11.4**

A Wikipedia page after editing. In the UI tabs at the top of the page, users can quickly access the "Edit" tab where they can directly edit and then save a new version of the page. For more substantial editing decisions, they might visit the "Talk" tab to discuss with other editors first.

adding a missing comma to conceptually restructuring the article (see Fig. 11.4). In traditional organizations, the typical way to deal with larger-scale tasks is to introduce a hierarchy that decomposes tasks and clarifies authority and accountability. Hierarchical task decomposition, integration of work, and quality oversight have been explored in large-scale collaborations like crowdwork (Kittur et al., 2013). As efforts scale, the role of leadership and expertise becomes apparent in ensuring a successful outcome (Luther et al., 2010).

## 11.2.4 Number of communities of practice

A community of practice refers to the idea that over time individuals form a group as they teach and learn from one another and develop coherent values, norms, and practices (Wenger, 1998). A group or team may reflect many different communities of practice that must come together to coordinate and work toward a common goal. The notion of interdisciplinarity is key here: When scientists want to start a company around their brilliant new discovery, they need disciplines like engineering, law, accounting, communications, and business to develop that idea into a viable product for the market. Yet the ways of thinking and the vocabulary in these different communities of practice may differ

substantially—to an engineer "code" is something that a computer interprets, whereas for a legal professional it may correspond to a statute that needs to be adhered to. Different communities may have different goals or notions of impact, different standards, or different toolsets that reflect disciplinary educational patterns. At one extreme of the spectrum, a group may consist of a single community of practice, whereas at the other end, there is a huge diversity of people in the world that may come together from various disciplines, ways of working, language, and culture to collaborate. Working in diverse teams means that different communities of practice may need to be bridged.

## 11.2.5 Nascence

New groups of people are constantly popping into existence to coordinate their actions, while others have been around for a long time. Some of these groups only last for a short while, such as for coordinating a response to a local natural disaster, whereas other groups may be around for many years or even generations. Nascence refers to the degree to which coordinated actions are already established and routine or if they are un-established, new, and developing. For instance, early on, different (and potentially diverse) team members may need to align goals and develop common ground. The organization of collaborative work is often in flux on the birthing of a new group, team, or community, but that is not to say that communities that have been around much longer can't still continue to develop. Periods of routine work may need to adapt all of a sudden to new demands, contexts, or norms. Research has shown that the characteristics and behaviors of founders early in a group's lifespan predict how long it will survive (Kraut and Fiore, 2014). Actions like visiting the group frequently, having multiple group administrators, and articulating a group description and logo during the group's most nascent stage (i.e., the first week) predicted group survival.

## 11.2.6 Planned permanence

Some coordinated actions are shorter-term, whereas others are longer-term. For instance, responding to a crisis event may take place over the course of hours, days, weeks, months, or even years, and it may be apparent at the outset based on the magnitude of the response needed that the timescale would fit into any of those buckets. Regardless of whether collaborations are temporary or permanent, the participants will need to develop shared vocabulary and coordinate work practices and output. When participants know that a collaboration should and will endure for a longer time frame, they may also begin to develop their own standards that coalesce ideas from different communities of practice. Planning for longer-term collaboration can oftentimes entail a higher overhead in terms developing and agreeing on administrative and work frameworks or policies.

**FIGURE 11.5**

Three example badges used in the DUST alternate reality game (http://fallingdust.com) to signal different achievements during collaborative play.

### 11.2.7 Turnover

Turnover refers to the stability of the people involved in a collaboration in terms of how frequently new participants enter and leave the group. On one end of the spectrum are coordinated actions that may have a very slow churn, such as an e-mail list of school administrators, whereas on the other end are collaborations where new people are constantly coming and going, such as online discussion boards that don't require registration. For instance, an analysis of the online commenting activity on *The Economist*'s Graphic Detail blog showed that over the course of eight months, about 79% of users who commented did so only once, indicating a smaller group (21% of users) who repeatedly left comments (Hullman et al., 2015). Such a high turnover and steady inflow of new contributors can pose difficulties to developing policies and behavioral expectations and norms for the group. One design approach toward this issue is to give users badges that indicate their tenure within the community or that otherwise mark them as "verified" or "trusted" (see Fig. 11.5). Another approach is to welcome newcomers to a community by creating positive onboarding experiences and interactions with established community members (Morgan et al., 2013).

## 11.3 Specific Goals and Contexts

People collaborate because doing so is satisfying or productive. Collaboration allows individuals to reap the emotional rewards of socializing and interacting with others, to accomplish greater goals than they could alone, or to meet and transact with people who they otherwise couldn't. In this section, a macro-HCI perspective is taken by exploring the dimensions of the MoCA model in connection with diverse contexts in which collaborations emerge. Contexts vary not only in terms of the goals and tasks that primarily concern users but also according to the social and physical context (e.g., mobile, in a car, in a classroom, in a public space) as well as along the dimensions of MoCA.

### 11.3.1 Communication and conversation

One of the essential coordinated actions that most people participate in on a daily basis is exchanging ideas, information, and knowledge with other people via conversation. Users can do so via their voice, by writing down those ideas, or by using their faces to emote and their bodies to gesture. Different conversation tools make possible the use of one modality or another, but people will make use of whatever channels they have available. For instance, on the telephone, users lose the ability to scowl at their interlocutor as a sign of disagreement, whereas on a Skype video conference, users do have the ability to use nonverbal visual cues like facial expressions, hand gestures, body posture, or direction of gaze in order to help express an idea. At the same time, while unhappy telephone users can't convey a scowl, they can still modulate their voice to make a disagreement known. Telepresence (see Chapter 7) goes even further by providing a panoramic multi-video view and a more immersive (e.g., 3-D virtual reality) experience or by physically extending one participant into the space of another using robotics. Design dimensions such as the physical environment, mobility of participants, and visual feedback, among others, are factors in such systems (Rae et al., 2015).

Conversation systems often vary in the degree of *synchronicity* they support. Voice or video conferencing systems tend to be highly synchronous, whereas chat systems can support synchronous or asynchronous modes, and discussion boards or e-mail listservs tend to be less synchronous. Some chat systems have explored the implications for how interactions change when communications are ephemeral by design. For instance, Snap-Chat (shown in Fig. 11.6) is a popular app that allows users to share silly photos, videos, and doodles with their friends that can only be viewed for up to 10 seconds before they disappear. This raises an interesting design question about how limiting the *planned permanence* through a design constraint can lead to interesting new genres of communication.

Conversation systems often also vary along the dimension of *scale*: chatting with a best friend over iMessage is a very different kind of experience from participating
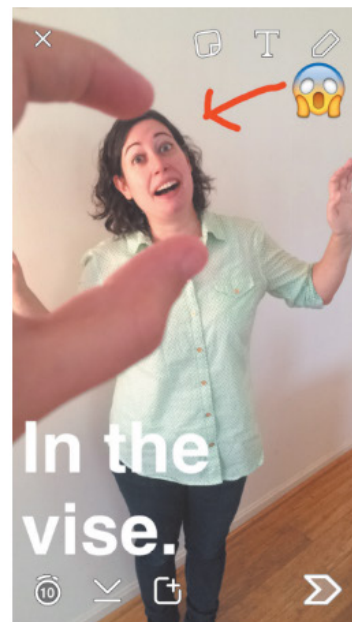


**FIGURE 11.6**

SnapChat is an app that allows for the composition of photos, doodles, and emojis that when sent to friends can only be viewed for up to 10 seconds as shown by the small clock with the "10" in the left corner of the composition UI.

in an e-mail group listserv, which is different still from writing a public comment on a *New York Times* article. In large-scale discussions, the pace may be slower and users may have little or no knowledge of the identity, reputation, background, or physical location of other participants. In order to coalesce conversations that are dispersed in a social network site like Twitter, the use of hashtags has emerged so that disconnected users can find each other by referencing and searching for the hashtag. Anonymity or even just the lack of persistent identity can result in flaming behavior, including swearing, name calling, or other ad hominem attacks (Diakopoulos and Naaman, 2011). Missing identity information can mask large disparities in the *number of communities* of practice and the *turnover* of the participants making it difficult to build common ground and shared vocabulary.

## 11.3.2 Online markets

Buying, selling, and trading—they've been driving commerce for a few thousand years. But the past 20 years have seen the nature of these activities change dramatically as people adopt the internet for shopping, trading, buying, selling, and delivery of goods. Online marketplaces like Amazon, Airbnb, eBay, and Etsy present a multitude of options, allowing buyers to connect and do business not only with traditional corporations but also with individual collectors, artisans, or service providers. This allows for hitherto unseen *scale* and *physical distribution* of participants in a transaction. Etsy users can buy a handcrafted steampunk costume item from the other side of the world as easily as the other side of the city (though maybe with different shipping costs). Markets often tend to be lower on the *synchronicity* scale in order to accommodate convenience for buyers and sellers shopping and fulfilling orders on their own clock as needed. Engendering trust in participants who have never met and may not even have a lot of background on each other is a key challenge for designing effective online marketplaces.

To cope with the scale of people, items, and content that is present in online markets, *collaborative filtering* algorithms have been developed (Linden et al., 2003). One approach to collaborative filtering works by representing the purchase or preference data of each individual in the market and then identifying other people who have a similar profile. Items from other users that are similar to a given user are then ranked and presented to that user as "related." The thinking is that if two users are similar in their preferences and purchases, then they might have good product recommendations for each other. What's interesting about collaborative filtering is that it is an implicit form of collaboration: Two individuals may have never interacted directly or even know about each other—in fact, they may be completely anonymous to one another. Other forms of feedback have also emerged in online markets. eBay, for instance, has a feedback score that is simply calculated as +1 point for a positive rating and -1 point for a

| Star | Color | Number of ratings |
|------|-------|-------------------|
| ☆ | Yellow | 10 to 49 |
| ★ | Blue | 50 to 99 |
| ☆ | Turquoise | 100 to 499 |
| ☆ | Purple | 500 to 999 |
| ☆ | Red | 1,000 to 4,999 |
| ☆ | Green | 5,000 to 9,999 |
| ⭐ | Yellow shooting star | 10,000 to 24,999 |
| ⭐ | Turquoise shooting star | 25,000 to 49,999 |
| ⭐ | Purple shooting star | 50,000 to 99,999 |
| ⭐ | Red shooting star | 100,000 to 499,999 |
| ⭐ | Green shooting star | 500,000 to 999,999 |
| ✦ | Silver shooting star | 1,000,000 or more (Wow!) |

**FIGURE 11.7**

The eBay rating scale uses icons that correspond to different levels of positive feedback.

negative rating. Higher scores are signaled via icons of stars of various colors and styles being shown next to a user's account, allowing users to quickly assess whether they want to do business with each other (see Fig. 11.7).

## 11.3.3 Meeting coordination

Sometimes users merely need the aid of communication tools in order to coordinate a real-world meeting time and location. Such tools can allow users to create groups and communities that can come together as needed to coordinate *IRL* (in real life). A powerful example of this is the Meetup platform, which according to its website in 2015 claims to facilitate more than 9,000 local group meetings every day by helping those groups self-organize. The platform integrates capabilities to schedule and locate meeting events, to send e-mails out to group members, to record RSVPs and manage attendance, to upload and share media like photos and videos after the event, and to comment on events and share information or opinions that are persistent for others. Meetup is squarely targeted at supporting communities that are in a relatively nearby *physical*

*distribution*, such as the same city. Its website's features are also mostly oriented toward the asynchronous end of the *synchronicity* spectrum (i.e., asynchronous planning for a synchronous event), making it ideal for casual users to come in and out of the event planning on their own time. The platform is agnostic to dimensions such as *number of communities*, *turnover*, and *planned permanence*, allowing for a great deal of flexibility for group leaders to define the scope of their community as needed.

Another very popular context for meeting coordination platforms is online dating sites. The needs of such tools are very different to a platform like Meetup, though; the *scale* of a meeting, for instance, is (most often) fixed at two. Potential romantic partners need ways to break the ice in what can sometimes be an awkward situation, they need ways to chat sometimes synchronously and sometimes asynchronously, and they need ways to arrange for dates where they feel comfortable and safe. The ways in which users are able to portray their identity and personality are important. In late 2015, eHarmony boasted an average of 438 marriages a day as a result of partners meeting on the site, and the OKCupid site reported more than 7 million messages exchanged per day among hundreds of thousands of users. Yet the demands of the romantic meeting context are quite different than those of a more general-purpose social network site. *Turnover* of users is quite high as old users are matched and drop off the platform. The frequent desire to meet romantic partners face to face means that strong filtering for the *physical distribution* of matches is a key feature. The types of communications afforded need to support an entire range of *planned permanence* from a single message exchange to a single IRL meeting to a more involved relationship that results in a long-term relationship. The communication on such platforms can adapt as the planned permanence of the interactions shifts.

## 11.3.4 Creative production

Whether it's developing new software, writing an online encyclopedia, remixing or animating a movie, or conducting an international science experiment, big creative projects demand that users work together. Work needs to be broken down into pieces and re-assembled, contingencies and interdependencies require planning, quality must be ensured, different roles and skills must be brought to bear, and supporting administrative duties underlie it all. Because creative productions often involve original and innovative output, there is sometimes no obvious or clear path forward, making group leadership especially important. Creative collaborations touch on and encompass some of the previous contexts mentioned above, namely communication, conversation, and meeting coordination. In addition, there is often an informational substrate, such as data or media, that needs to be managed in the course of the creative work. For instance, Bootlegger is a mobile app (see Fig. 11.8) that facilitates
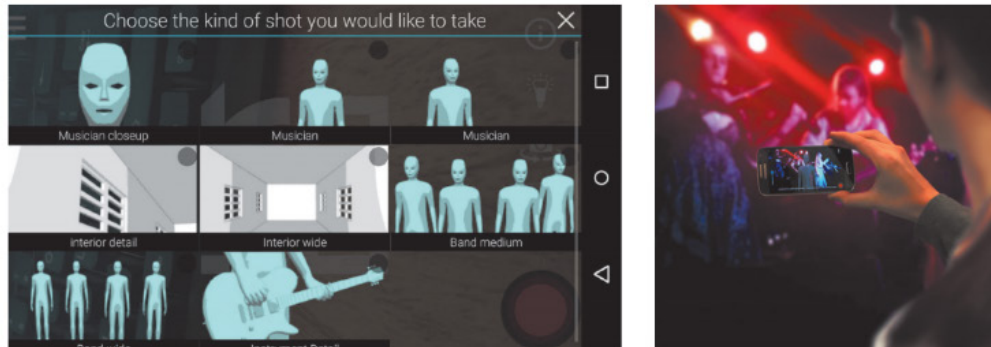
**FIGURE 11.8**

The Bootlegger app allows users to coordinate the creative production of videos around live events.

collaborative work around the substrate of video, coordinating its collection and editing around live events. In other applications, features like access control can become important so that some participants are only allowed to contribute at particular stages of the process or to specific tasks (Olson and Olson, 2013). Various platforms and tools exist to help facilitate these activities, from social coding platforms like GitHub to file-sharing tools like Dropbox and project management tools like Slack or Basecamp.

Because of the breadth of possibilities, collaborative creative endeavors can more or less exist almost anywhere within the design dimensions of the MoCA framework. For instance, the *scale* could be a couple software developers working on an open source widget, or it could be hundreds contributing to the Mozilla Firefox codebase. The *physical distribution* of work is often wide so that creative projects can tap talent wherever it may reside. Oftentimes the *number of communities* of practice will be greater than one in order to marshal different people with different talents, such as an animator, sound designer, and programmer working on an interactive game together. As a result, leadership and experience are often needed to coordinate different ways of working and thinking about the project (Luther et al., 2010).

## 11.3.5 Crowdsourcing and crowdwork

A growing number of online services exist to help people find paid work as contractors online. While there are a range of crowdwork platforms available, such as Fiverr, CrowdFlower, or TaskRabbit, a representative example of a paid crowdwork system is the Amazon Mechanical Turk platform, where "requesters" can specify a task (called a HIT which stands for Human Intelligence Task), an amount to pay, and a time frame for the task, and workers (or "Turkers" as they're often called) can browse for available tasks and sign up to complete

those that they find interesting or rewarding. This allows requesters to tap labor across a wide *physical distribution*, and it allows workers flexibility to step in and out of working without having a formal employment relationship. Crowdwork is in slight contrast to other forms of crowdsourcing, which includes other activities like serious games or citizen science that motivate users to participate for reasons besides money. A popular crowdsourcing project was the New York Public Library's effort to digitize historical menus from the library's archives. It was able to transcribe 8,700 menus in just four months by placing the digitized images online and allowing visitors to click a menu item, type in what it was, and submit (see Fig. 11.9).

A model of crowdwork recently published by Kittur and colleagues (2013) articulates a number of research areas, including workflows that support task decomposition, dependence, and synthesis; task assignment to match worker abilities and skills to tasks; hierarchy to create leadership structures; latency to support real-time tasks; synchronous collaboration; quality control; job and task design to maintain interest; reputation and credentials; and motivation and rewards. The power imbalance between requesters and workers on many crowdwork platforms also suggests the need to consider ethical issues and
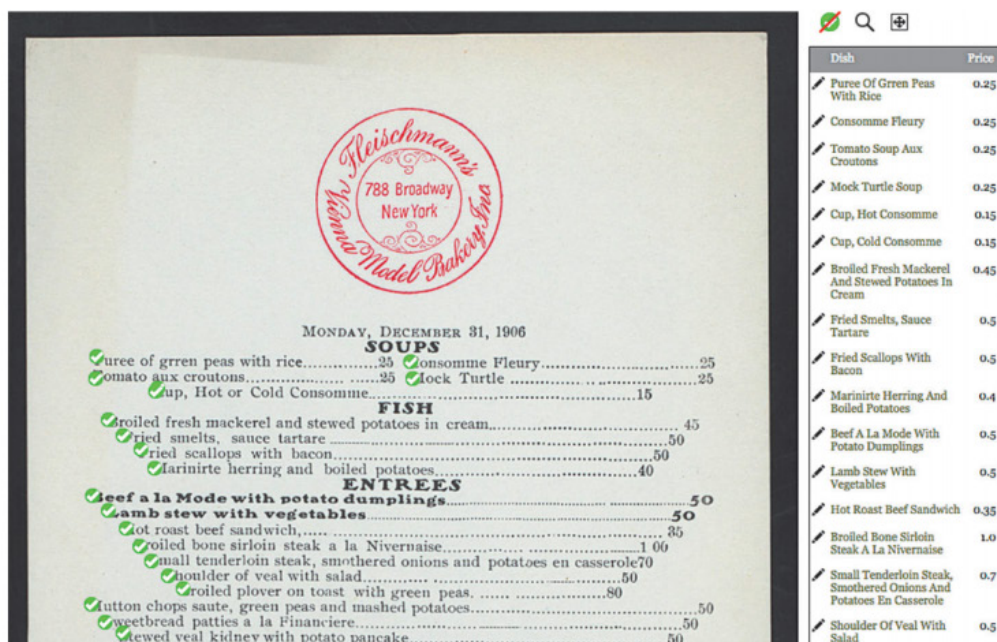


**FIGURE 11.9**

A historical 1906 menu from Fleischmann's Bakery digitized by the New York Public Library in collaboration with thousands of crowdsource volunteers who helped type in individual menu items. Note the UI list at right reflects and allows for navigation of items to be digitized.

worker rights outside of traditional employment arrangements. Crowdwork may be characterized by high *turnover* and *nascence* since workers may come and go from participating in a given task of their own accord. Such work arrangements tend toward the short-term end of *planned permanence*, as a given requester may need a specific task accomplished after which time the labor force can be disassembled easily. Some of the research challenges posited by Kittur et al. also touch on dimensions of the MoCA framework, such as how to support crowdwork that is high in *synchronicity* and how to assign tasks to a diverse labor force that may draw on a higher number of *communities of practice*.

## 11.3.6 Entertainment and gaming

It's human nature to seek amusement and mirth in the company of others. Many online services and communities exist to help meet the need to meet and "play" with one another, including, for instance, massive multiplayer online role-playing games (MMORPGs) with titles like *Ultima Online*, *World of Warcraft*, and *Star Wars: The Old Republic*. Whether fantasy, sci-fi, or otherwise themed, people enjoy playing such immersive games as they allow not only for the traditional fun of games, with goals, scoring and advancement, competition, and reward mechanisms, but also for social interaction and teamwork in the pursuit of goals. Each player controls a character in a virtual world and develops an identity and an avatar with a unique constellation of skills and attributes. In *World of Warcraft* (*WoW*), for instance, players form guilds that collaborate to engage in various quests, raids, and role playing (Rheingold, 2014). The guilds coordinate different members' skills in order to succeed and give guild members an opportunity to build team collaboration skills in a safe, playful environment. Early research on *WoW* studied the ways in which people engaged in guilds within the game and found that players used in-game relationships to meet new people as well as extend real-life relationships (Williams et al., 2006). The popular online comedy series *The Guild* lampoons these permeable boundaries between in-game and real-life relationships.

Interestingly, factors like the *scale* of the guild and the *turnover*—or, as Williams calls it the "guild churn"—are key in defining the nature of the interactions that occur. For instance, larger-scale guilds tend to be more goal-oriented toward game goals, whereas smaller guilds tend to be more focused on social bonds (Williams et al., 2006). The *nascence* of a guild that was developing is sometimes found to create conflicts between players with different expectations for friendliness, sharing, and leadership.

Online role-playing and guild behavior are of course just one type of, albeit very popular, online play. Other online social games include those that are integrated into social network sites like Facebook or simply provide a portal through which players can find and compete against others in classic games like poker.

### 11.3.7 Education

Recent years have witnessed an explosion of interest in interactive course materials available online from platforms like Coursera, Udacity, and EdX. These courses have come to be known as *massive open online courses* (MOOCs) because they often offer open enrollment and attract anywhere from 100 to 10,000 students. Online communication and collaboration systems have become common for distance education courses both as supplements to face-to-face classes as well as stand-alone offerings students can engage with to suit their ongoing learning needs. Such systems not only offer new ways for students to receive information like lectures but also enable possibilities to engage and learn from other students from across the globe, take interactive quizzes and exams, and develop collaborative class projects. One study found that a tool for arranging and guiding synchronous video discussions among culturally and geographically diverse students in a MOOC led to better learning outcomes including higher performance on quizzes and exams (Kulkarni et al., 2015). Even for campus-based courses, communication technology now provides a means for a rich, collaborative learning environment that exceeds the traditional classroom in its ability to connect students and make course materials available on an around-the-clock basis.

Online collaborative education in MOOCs defines a unique coordinate within the MoCA model. The *scale* is potentially immense, and the *physical distribution* can likewise be very broad. Because such courses attract an international audience of users who could not otherwise access educational opportunities and because there may not be a good way to enforce prerequisites, the set of interacting students on these platforms may also come from very diverse *communities of practice*. An educational course is something with a defined start and end date, which defines a distinct *planned permanence* of a few weeks or months and which in turn means that the educational community around a certain course or topic is refreshed, or *turned over*, periodically. MOOCs are an active area of research that demand more study to assess and address how education can scale effectively.

## 11.4 Design Considerations

There is a catalogue of features that designers might design into communication and collaboration systems. Why are some features important, and how can they support certain types of tasks or interactions? An excellent reference is Kraut and Resnick's book *Building Successful Online Communities* (2012), which lays out a series of evidence-based design claims that connect certain observable conditions of a community to certain expected outcomes. An example of

such a design claim from that reference is: "Publicly displaying many examples of inappropriate behavior on the site leads members to believe such behavior is common and expected." The claim makes a specific connection between a possible design feature (i.e., displaying inappropriate behavior) and expected reception of that information by community members. However useful, such design claims can suffer the drawback of not being context-specific, and it is crucial to understand the context in which the designer is designing: not only the tasks but the diversity of participants along all of the dimensions discussed in Chapter 2, such as personality, cultural and international differences, older versus younger users, and cognitive or physical disabilities.

The remainder of this chapter examines design considerations rather than specific claims. Instead of making declarative statements about expected outcomes from a particular feature, the goal is to help with understanding why each design dimension ought to be considered and to see the connection between a feature and the tasks that might need to be accomplished across the range of contexts as articulated in the last section of this chapter. Design considerations are organized according to their impetus: cognitive factors, individual factors, and collective factors.

## 11.4.1 Cognitive factors

**Common ground**   Establishing common ground—the knowledge that communicators have in common—as well as jointly understood references during communication can be essential for effective collaboration. What do users mean when they say "this button" or "that menu"? If a user is standing next to someone and points with a finger at one of the buttons in an elevator, the user can be pretty sure that's the "this" being referred to. Pointing to and referencing objects is called deictic reference, or deixis. Other forms of reference include general (e.g., "upper left"), definite (e.g., using named entities like organization or place names), or detailed (e.g., described by distinctive attributes like "the red button") (Heer and Agrawal, 2008). When users engage in mediated communication, the channel may support referencing to a greater or lesser extent and thus require different levels of effort for people to achieve common ground (Olson and Olson, 2000). For instance, in video meetings, screens are often shared so that there is a common visual reference for discussion. But it can still be easy to get lost or not understand what users are talking about if they say "this button" because there may not be feedback on the shared screen for pointing to the button that the spoken "this" refers to. In full video meetings, users will often gesture with their hands as they talk, which can provide deictic information that makes what they're saying more easily and precisely understood. On social media, referencing is supported in several standard ways, including the @username syntax, which indicates a person with the given username is being referenced, and the #hashtag syntax, which indicates a topic is being referenced,

**Nick Diakopoulos** @ndiakopoulos · Aug 6
Very interesting computational journalism tool from @FILWD's lab

**Charles Ornstein** @charlesornstein

To analyze Yelp's 1.3 million health reviews, we used an amazing tool built for us by @nyupoly. Details: enrico.bertini.io/revex

RETWEETS    FAVORITES
4           7

9:56 AM - 6 Aug 2015 · Details

**FIGURE 11.10**

References can be embedded in a tweet on Twitter in several ways, including referencing another person's account (in this example, @FILWD) as well as referencing and quoting another person's entire tweet, providing vital context and citation for the information.

as well as embedding and directly referencing other's posts (see Fig. 11.10). Interfaces often include explicit referencing via threading of comments so that it's clear who is responding to whom in a larger conversation space. In designing communication systems, it's worthwhile to consider the nature of the tasks that need to be accomplished and how different forms of referencing may need to be supported in order to make those tasks efficient—or indeed possible at all.

**Social cues**   Beyond reference, there are a variety of other nonverbal cues that can also enhance communication, including facial expressions, gaze direction, posture, proximity, and bodily orientation (Baym, 2015). For instance, giving two thumbs-up on a video conference sends the message to collaborators that they are in full agreement with a suggestion. A furrowed brow or a smile and nod can convey a wealth of important feedback to a conversational partner who is explaining a difficult concept and wants to gauge understanding. Again, some media provide more possibilities for expressing these other channels of communication than others, yet even in "less rich" channels, like text, users adapt and develop mechanisms to convey social cues and emotions. The most popular of these are the emoticons that have become so prevalent in chat-based systems. Chat users routinely combine regular textual characters on the keyboard to indicate and convey various emotions. Research on Twitter has shown that emoticon use varies across culture, with Asian cultures favoring vertical emoticons using eye shape, (e.g., "^^" is a positive emoticon meaning "happy")

**DIVIDED BY A COMMON LANGUAGE**
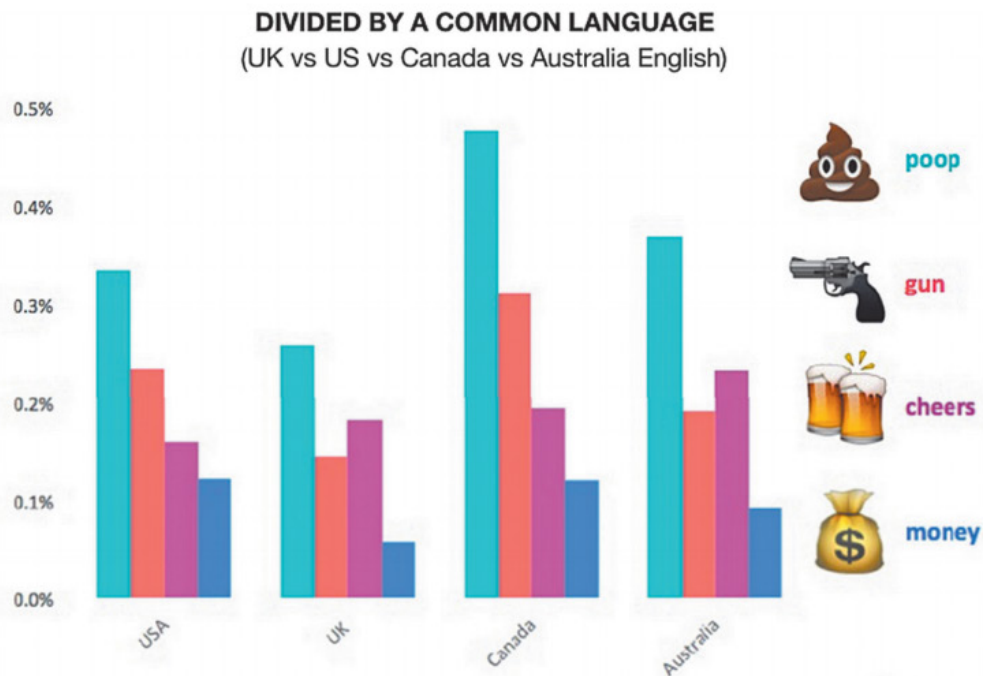(UK vs US vs Canada vs Australia English)



**FIGURE 11.11**
Emoji use varies across cultures.

and Western cultures favoring horizontal emoticons using mouth shape (e.g., ":p" is positive but with a tongue sticking out) (Park et al., 2013). Emojis are a cousin to emoticons but use actual iconographic representations of items (not just faces) to convey additional meaning and emotion in chat or social media. In an effort to respond to the desire for users to express emotional cues to one another, Facebook began experimenting in late 2015 with emoji reactions to posts that allowed for affective responses to indicate "love," "haha," "yay," "wow," "sad," and "angry." Emojis have proliferated with their integration into popular mobile phone software that allows users to type using the icons. Again, not all emoji use is the same around the world: A 2014 study from Swiftkey found that even within English, there is substantial variation in use of icons across US, UK, Canadian, and Australian users as shown in Fig. 11.11.

**Activity awareness**   The notion of social translucence argues that making social behavior visible facilitates awareness and ultimately accountability for one's actions (Gilbert, 2012). This might include making visible information such as "who sees what," "who's done what," and "who knows that I know." For instance, collaborators often need to maintain an understanding of what others have accomplished in a joint work activity around shared artifacts (Olson and Olson, 2013). Alerts and other interface signals are used to indicate
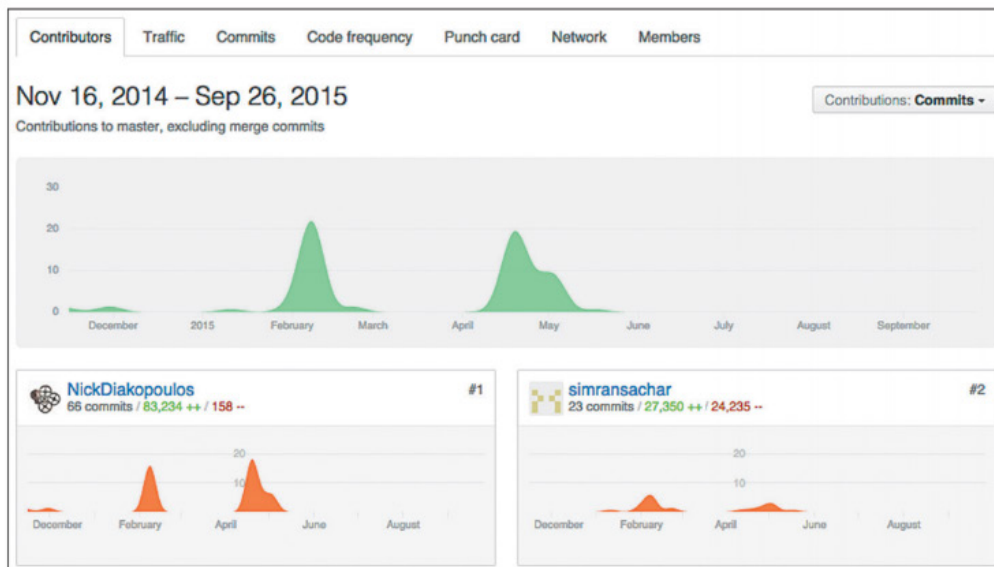
**FIGURE 11.12**

A Github dashboard charting project activity over time and indicating two users who are active in the project including their overall coding activity as well as volume over time. More details on activity are available by drilling into individual users.

when something has changed and by whom (e.g., "document updated on Monday at 4:23 p.m. by Andy D."). Not only does this allow collaborators to track how the work is evolving, but it also provides some level of accountability. So, for instance, if the last editor made a change that needs to be reverted, then the team knows whom to talk to about it. Awareness information has been studied extensively in collaborative software production, and research shows that cues relating to recency and volume of activity, sequence of actions over time, attention to artifacts or people, and detailed information about an action can help support social inferences like interest and level of commitment, intentions behind actions, importance to community, and personal relevance (Dabbish et al., 2012). Transparency of actions can also support learning by others who can then readily observe how a process works. On Github, a "contributors" tab on each project page offers an overview of activity and opportunities to drill into specific details of how individuals have contributed to the project (see Fig. 11.12).

**Interruptions**    Interruptions in or by communication channels can affect their usability. For instance, during a synchronous phone call or video call, a choppy connection due to poor internet service can cause unnatural breaks in the conversational flow. This can be frustrating to recover from since pausing and turn taking are normal components to conversation, and technical glitches can make it unclear whether a pause is intended (e.g., while someone is thinking of what to say next) or imposed (e.g., by the technology). For communication

technologies that tend more toward the asynchronous end of the synchronicity dimension, interruptions pose a different problem: When a new message, text, or e-mail arrives, a new alert is usually generated to notify the user. In an office environment, it's not uncommon to have the phone blinking at the same time as the phone or tablet beep and an icon starts bouncing at the bottom of the laptop screen. Research has examined the design space of interruptions and articulated various dimensions such as the symmetry of interruptions, the obtrusiveness (e.g., focal or peripheral), and the temporal gradient (e.g., historical, current, or predicted availability) among others (Hincapié-Ramos et al., 2011). Where a communication technology fits within this design space will affect how users integrate it into their workflow.

## 11.4.2 Individual factors

**Privacy**   One of the issues that arises in conjunction with greater activity awareness in a system is the concomitant loss of privacy. If activity is collected implicitly based on actions within the system—rather than explicitly recorded or set by the user—this could affect the use or adoption of the system, as users may not want others to see every little action they take. In many cases, it's important to know who contributed what in a collaborative work project so that issues, corrections, or applause can be directed and so that the provenance of the result can be better understood. In more open forums like social network sites, there may also be a need for privacy in cases where users want to communicate more sensitive information only to certain connections. The idea of *context collapse* reflects the possibility that communications meant for a limited audience might in fact be visible beyond that audience. For instance, a user might not want her mother or boss to see the photo she posted at 4 a.m. from a club on Mallorca, but she could be entirely okay with her close friends seeing it. On Facebook, users can tweak their privacy settings for a number of things such as who can see a post, what people can see on their profile, whether to hide a given post on their timeline, and whether the system suggests tags for photos based on facial recognition technology. In some cases, users' privacy may be violated because of algorithmic inferences. For instance, by analyzing what users "like" on Facebook, algorithms can be used to predict a range of sensitive personal information like sexual orientation, personality traits, ethnicity, and mental health (Lee, 2014). When designing communication systems, it's important to consider situations or contexts in which users may want different amounts of privacy and to offer some degree of control, adaptability, or facility to opt out.

**Identity**   Online communities open up a raft of questions regarding how people represent and portray themselves when people's physical bodies are not shown and text or avatars become the primary medium of communication. In an online game like *World of Warcraft*, an older man could play the character

of a young woman, or a teenager could role-play as a sage and aged magician. Less-media-rich channels provide flexibility in how people choose to express their identity or identities. One of the most crucial elements to identity is the name chosen (Baym, 2015). In some cases, such as in financial transactions, real names are necessary, whereas sometimes pseudonyms (i.e., unique monikers not tied to real names) or even full anonymity is more appropriate. Some social network sites, like Facebook, have a real name policy, but oftentimes forums allow people to use pseudonyms, which allow people to have one or more identities that they can use to interact in the same community but in different ways. For instance, a well-to-do attorney in town occasionally comments on the local paper's business articles, but sometimes also really wants to trash talk the local sports team without that being tied back to his lawyer identity. Having a different pseudonym for each type of comment supports the user's needs in this case. Research has shown that certain topics on the anonymous messaging app Whisper, including NSFW ("Not Safe For Work"), LGBTQ ("Lesbian Gay Bisexual Transgender and Queer"), "Drugs and Alcohol," and "Black Markets," reflect considerably more desire for anonymity, with older users being more sensitive to the need for anonymity in these categories of content than younger users (Correa et al., 2015). The disinhibition afforded by anonymity, while it can lead to crude and anti-social behaviors and cue de-individuation and mob behavior, may also contribute to experimentation and creativity (Bernstein et al., 2011). Moreover, anonymity in online communication can reflect legitimate human needs, such as a desire to make a confession of guilt or shame, share sensitive personal health information, test an idea without fear of reputational harm, or supply information for which users may be punished or fear other retribution if their true identity would become public (Diakopoulos and Naaman, 2011).

**Trust and reputation**   Related to identity is the notion of reputation and the ability to develop a sense of trust around that reputation. Trust can be defined as a reliance on a piece of information (or a person) and is particularly important in marketplace contexts where goods or services may be sought or exchanged. For instance, Yelp is an online listing service that helps consumers find and evaluate services or businesses that they may be interested in patronizing. It allows prior patrons to write reviews and to leave a 1-to-5-star rating. These ratings and reviews are then aggregated and presented back to others who are searching for that type of service. If users see a restaurant with 742 reviews and an average 4.5 stars, it's a pretty strong signal that they can trust that they will have a good meal there. Moreover, the interface allows the user to drill into the reviews and see individual write-ups, ratings, social activity, and feedback about other users, which can be helpful for evaluating their credibility (see Fig. 11.13). If someone who left a lousy review for a restaurant has previously written 20 other 4- and 5-star reviews, this is an indicator that the person has a reputation for writing very positive reviews and that the 1-star restaurant review must have been a spectacularly bad experience. When users engage in large-scale marketplaces
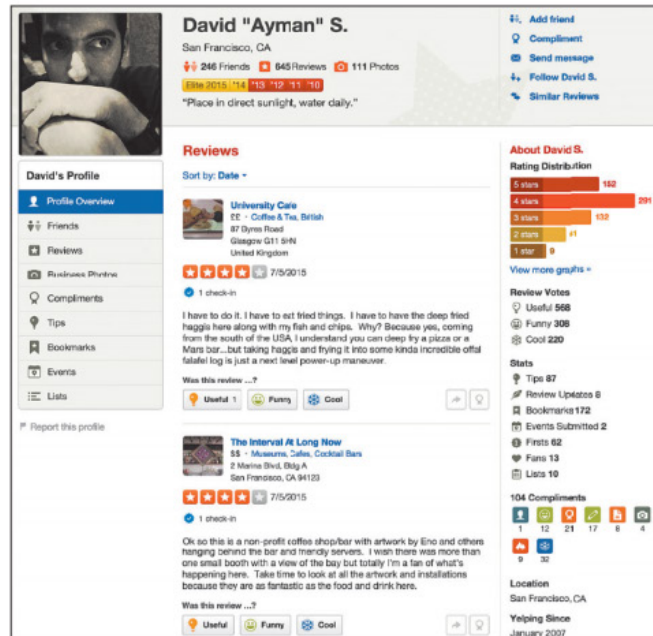
**FIGURE 11.13**

A user page on Yelp showing a variety of social activity context including volume of activity like reviews and photos, an "elite" badge, a graph of ratings previously made, feedback on the user's reviews (including if they were useful, funny, or cool), and other compliments. This rich information can help others understand the reliability of this user.

like this, reputation systems that track and reflect the ratings and previous behaviors of other actors become important components to communicating trustworthiness of those actors.

**Motivation**   As in any interactive system, it is crucial to understand why people engage in collaboration and communication. There is a strong intrinsic motivation for interpersonal connectedness (Deci and Flaste, 1995), but there are a wealth of other reasons people also partake in and sustain interest in collaboration and communication, such as altruism, reciprocity, reputation or status, and habit (Preece and Shneiderman, 2009). One way to understand this is using the Uses and Gratifications framework (Ruggiero, 2000), which describes how and why active media consumers engage media in order to satisfy specific needs. The framework offers a typology of gratifications that people typically seek from media, including exposure to information, an opportunity to test their personal identity and see where it fits, a chance to interact socially, and pure amusement and entertainment. In a study of an online news commenting community, all of these gratifications were observed when participants

were asked about what motivated them to either write comments or read them (Diakopoulos and Naaman, 2011). Other studies of online communities have also applied the Uses and Gratifications framework and found that motivations can shift: Gratifications sought can differ from the gratifications that are ultimately obtained (Lampe et al., 2010). Motivations can also change over time, behooving designers to understand how this affects turnover in a community. For instance, in the context of citizen science, research has shown that initial participation is motivated by things like personal interest, self-promotion, and social responsibility, whereas sustained longer-term participation relies on users receiving acknowledgment for their efforts and mentorship and being reminded of common goals (Rotman et al., 2014). In still other contexts of collaboration, like crowdwork, monetary rewards also come into play (Kittur et al., 2013). The diversity of motivations in online communities underscores the mandate for designers to understand that diversity, to conduct surveys or focus groups to better understand the value that users are receiving, and to consider universal usability in designing user experiences that accommodate different motivations.

**Leadership**   Leadership constitutes an ability to guide and direct a group's activities. It's complicated in online scenarios because it can be harder to maintain awareness of others' activities and to develop and maintain rapport and trust (Olson and Olson, 2013). Leadership is particularly important when there is a high degree of task interdependence such that different team members are relying on each other for intermediate work products. Leaders are often responsible for developing and managing a work plan, mediating disputes or other problems as they arise, clarifying roles and objectives, making sure the right information gets to the right team members, monitoring progress and quality, and enforcing policies. Leaders are often also the members of a group who synthesize and articulate higher-level group ideas or goals and who tend to take responsibility when problems emerge (Preece and Shneiderman, 2009). Research in collaborative creativity tasks suggests that although formal leaders are present and will initiate projects, tools can support alternative leaderships styles where, for instance, leadership responsibilities can also be delegated and redistributed across the group (Luther et al., 2013). For designers of systems that enable creative production or crowdwork, careful consideration should be given to how leaders can be empowered to initiate and lead groups, accomplish the other demands of managing group work, and maintain their motivation to continue in their role.

## 11.4.3 Collective factors

**Deviance**   A social norm can be defined as "a stable, shared conception of the behavior appropriate or inappropriate to a given social context, that dictates expectancies of others' behavior, and provides 'rules' for one's own behavior"

(McKirnan, 1980). Different societies, cultures, and sub-cultures may have their own social norms for what constitutes acceptable behavior within that group, but when a member of a group violates a social norm it is considered a socially deviant action. People who are known to intentionally violate group norms are often termed "trolls" and their activities are referred to as "flaming". Trolls will post inflammatory comments that poke, prod, and antagonize other community members for their own amusement (Lee and Kim, 2015). Another form of deviant behavior is based around selfish manipulation—for instance, in online marketplaces a manipulator might create shill accounts and leave fake reviews in order to falsely hurt or help the reputation of another (Kiesler et al., 2012). In crowdwork platforms, deviant behavior might involve signing up for work and then doing just enough to make it appear as though the shoddy or rushed work is acceptable. People aren't always perfect, and in some cases they may not be aware of the specific norms of the community they're participating in. For these reasons, designers must be keen to consider various ways in which deviant behavior can be regulated or to make social norms more apparent and salient so that non-normative behaviors are reduced and their impacts on the community lessened.

**Moderation**   Given that deviant behavior is to be expected in some measure within online communities, one of the approaches to cope with the issue is to have moderators evaluate contributions and take various actions on the postings. For instance, a moderator could delete a post that harasses another user, or the moderator could demote the post and make it less visible. Moderators can be professionals, as is the case for the commenting system at the *New York Times*, or they could be members of the community itself, such as on the Slashdot site. In some cases, automated text analysis algorithms are used to assess posts and determine if they use language in an unsavory and potentially inappropriate way. On the Yelp platform, algorithms are used to automatically identify reviews that may be fake in an effort to minimize their impact; the fake reviews are de-emphasized in the interface but not deleted entirely. Oftentimes community members are able to flag certain content that they believe is in violation of the community norms. These flags are then reviewed by professionals in order to make a final determination of whether the content should remain published (Diakopoulos and Naaman, 2011); however, such approaches struggle to scale for very large communities. Of course, no moderation system is perfect, and people who have their postings removed will likely want to know why. Transparency in the moderation criteria can lend legitimacy to the process so that users understand how the decision was made (Kiesler et al., 2012). Another technique that can be used to moderate a community conversation is to gag or ban users either temporarily or permanently. Sometimes a cool-down period can be an effective way for signaling to users that they need to reform their behavior.

**Policies and norms**    Policies, rules, and norms can be important signals to users in online communities so that they know what constitutes acceptable versus unacceptable behavior and so that protocols for adjudication of moderation or other decisions are apparent. Knowing the etiquette for a given channel or community may not always be immediately apparent. Thus, policy documents are often posted in places where users can easily find them. For instance, on Reddit, a social commenting site, the Reddiquette for the site lists a variety of guidelines for behavior, including "Use proper grammar and spelling," "Look for the original source of content," and "Search for duplicates before posting." These rules of good behavior are useful for newcomers as well as existing users. Another way for users to learn about accepted norms is to observe and understand others' behavior, including which behaviors are sanctioned and which are praised. System designers can make such behaviors more or less salient to ease the learnability of the system. For instance, on the *New York Times* site, norms about the acceptability of comments are communicated by labeling exceptional comments as "Times Picks," which offers a valuable feedback signal to both the commenter as well as to the rest of the community (see Fig. 11.14). Policies and norms can be enforced either through technical regulation (i.e., the system makes it difficult to violate rules) or through social processes of regulation (i.e., rules may be broken but later sanctioned through social processes such as the moderation discussed above). The method of application of policies and rules is an important component to consider in a broader sociotechnical design of a communication technology. The way that users will behave using a tool is not just a matter of the tool's features but also of how other actors, like administrators, moderators, and other users, are perceived and act, including the ways in which policies are enforced and norms are made salient.
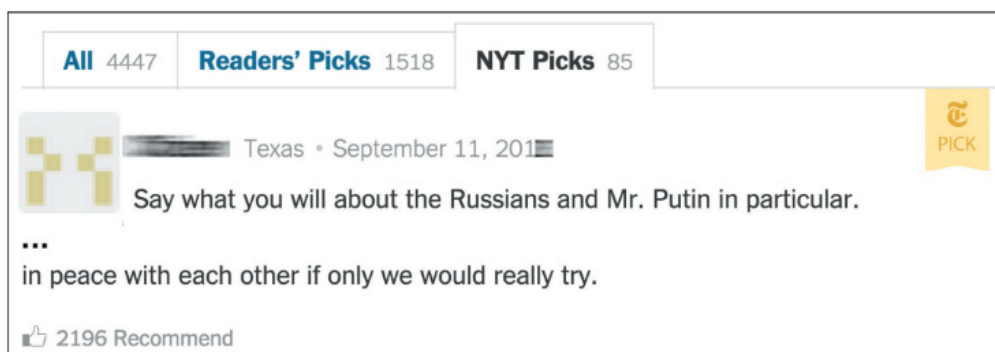


**FIGURE 11.14**

In the *New York Times* commenting system, moderators mark some comments as "Times Picks" with a bright yellow badge, indicating they are exceptional comments and signaling norms about what constitutes an interesting and valuable contribution to the comment thread.

## Practitioner's Summary

Communication and collaboration tools are continually evolving to support human interactions across the full range of human experience. While there are many positive outcomes derived from using such tools, designers must also be aware that negative behaviors are possible and should be prepared to consider mitigating design alternatives. It is essential to understand the myriad contexts in which users may employ communication and collaboration systems from conversations to markets, meetings and creative work, entertainment, crowd-sourcing, and education. Models such as MoCA can help in thinking through these various contexts during the design process to understand what may be similar or different about the particular design context being addressed. Other design considerations that can affect the user experience and usability of communication and collaboration systems include common ground, social cues, activity awareness, interruption, privacy, identity, reputation, motivation, leadership, deviance, moderation, and norms. Interface and experience design of communication tools must be an iterative endeavor as people and technology adapt and co-evolve.

## Researcher's Agenda

There remains a rich variety of open questions that relate to the design and understanding of communication and collaboration tools. Perhaps most importantly, predictive theories that connect design decisions to specific outcomes still need to be developed. Designers will benefit from improved theories that can guide their work in making decisions in the contexts described in this chapter. In line with this are questions that approach the larger macro questions of organizational and societal impacts of communication and collaboration systems: How will home and work life be changed? Can such technologies restore community social capital, or will time online only increase distance from neighbors and colleagues? Will patients, consumers, and students become more or less informed and trusting? How will important social issues relating to public health, democracy, international relations, and humanitarian crises be affected? Answering such questions will require taking a long view and examining behavior at the macro level. Some of the attraction for researchers stems from this vast uncharted territory: Theories are still needed, controlled studies are difficult to arrange, and analysis of big data has its own challenges. In short, there is a grand opportunity for researchers to influence a still-emerging field and study some of the biggest questions of our time.

## WORLD WIDE WEB RESOURCES

www.pearsonglobaleditions.com/shneiderman

Using communication and collaboration tools is an effective way to develop intuition for their design. Many sites and apps exist to experiment with, including:

- Facebook: http://www.facebook.com
- Twitter: http://www.twitter.com
- Reddit: http://www.reddit.com
- Slack: http://www.slack.com
- eBay: http://www.ebay.com

To get started with social network analysis, NodeXL is a powerful tool that facilitates both gathering and visualizing data:

- NodeXL: http://www.smrfoundation.org/tools/

An evolving list of data collection and analysis tools for social media is curated by:

- Deen Freelon:
  http://dfreelon.org/2015/01/22/social-media-collection-tools-a-curated-list/

## Discussion Questions

1. Take a position on whether you feel user interfaces for work will remain isolated or if they will become more collaborative. Present evidence to support your argument.

2. How does collaborative filtering contribute to online marketing?

3. Differentiate the roles of face-to-face encounters and collaborative interfaces. Explain the limitations and benefits of each type of communication.

4. Below are the seven dimensions of the MoCA model (Lee and Paine, 2015). Cite examples of each and how you feel it might influence a successful collaboration.
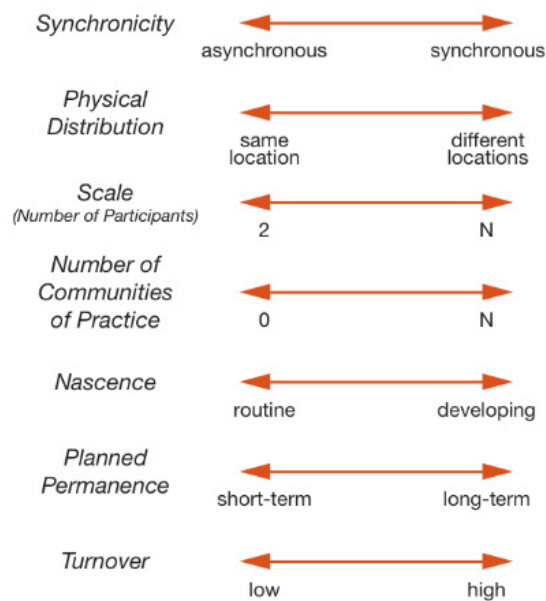


5. Explain how collaborative interfaces can improve or harm teamwork.

6. Explain how an interface designer can protect users of a collaborative interface from hostile or malicious behavior.

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