

Twine: A Tool for Large-Scale Organization Microblog Analytics

Enterprise Twits

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APRIL 13, 2009

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INTRODUCTION

Imagine you are an Human Resources (HR) representative in a 10 person office. Your boss just made a big decision that effects everyone in the company and you are posed with the task of finding out "How the troops are holding up" as your boss puts it. You walk around to each person, hear what he or she has to say, and then report back to your boss with the general feeling among the employees of the big decision.

Now, imagine you work for Walmart, a company with more than 2,000,000 employees, at least 10% of which are facing computers everyday. You, as one of many, many HR reps are posed with the same task: find out "How the troops are holding up" after a big decision was made. In order to accomplish this, a survey team creates a survey to be deployed, completed and returned by every employee. Of course, it is not as easy as sending out surveys to every Walmart location and having employees fill them out and send them back: someone has to make decisions about how to organize and execute the deployment process; arrangements have to be made to get the surveys about the big decision to each location; employees need to be organized to participate in the survey; they then have to be sent back to some central location to be tabulated, recorded, and analyzed. A few weeks after this whole process starts, you finally have the answer to your question: people aren't happy with the big decision.

Unfortunately, given the time it took to answer this question, certain internal issues have already gained steam and have employee backing. Now, you and your fellow HR reps are on "damage control" duty addressing everyone's concerns. If only you had a tool deployed before the big decision was made that could have given you some immediate feedback as to what your employees were feeling before the situation got out of hand.

In this paper, the need for a large-scale HR issue and morale tracking system within large organizations will be outlined. The purpose of such a system being to gauge feedback in real time and provide HR representatives with a means of tracking, gauging, and monitoring organizational issues that would otherwise be difficult to track and from which to obtain feedback.

LITERATURE REVIEW

What are the roles of HR? To recruit, train, and retain employees that will provide their organization with the greatest value possible. And a huge part of retaining the best talent available (and getting the most out of these employees) is keeping them happy. "Just as job satisfaction affects productivity, quality and morale, there is a strong correlation to commitment."(Stum, 1998) Not only will happy employees be more productive, but they are less likely to leave the company and thus retention reduces the costs of turnover. The question arises—how will managers know if employees are unhappy? What if there is something small an organization can do to make their employees' work lives significantly better, if only HR or management knew about it?

At most companies there are ways for employees to make management aware if they are facing serious problems such as harassment, discrimination, or regulatory breaches. However, these

procedures are frequently time-consuming and costly, and are certainly not intended to be filed for minor irritations. And yet, minor irritations can lead to greatly decreased happiness in general. Micro-stressors, or the small annoyances and inconveniences of every day life, have more of an impact on health and overall stress than major life events or catastrophes (Kassin, Fein, & Marcus, p. 514, 2007). By decreasing micro-stressors in the workplace, companies can hope to alleviate some of the annoyances and stress that are felt by employees.

It may seem counter intuitive management to tell employees to complain, but otherwise, there is no way to know that there is a problem in the workplace. A shortsighted organization might discourage “whining” from the ranks, but without an established way to address employees’ problems, “Complaints are repressed and ultimately debilitate the organization.” (Eubanks, p. 36, 1990) Not only will a minor grievance policy allow employees to vent or give feedback, but it can help the company as well. “Timely, candid information has value for purposes ‘from avoiding lawsuits to getting great ideas for improving the company,’” (Hirschman, p.51, 2008). Soliciting and responding to complaints stands to benefit both employees and the organization as a whole. Feelings of control and involvement can reduce the effects of stress, even when the problem is intractable or the person does not take advantage of the control mechanism! (Glass & Singer, 1972). In one particular instance, having an upgraded air quality complaint system in place improved perception of air quality, though no changes to the building were made (Occupational Hazards, p. 75, 1994). Along with the perception of control, the information employees can provide employers with perspectives on the company that would otherwise go unheard. Pertinent workplace issues have a channel to be addressed, companies are able to discover small problems before they become large ones, to increase employee happiness, and to foster trust and good relationships between management and employees. Organizations have an opportunity to learn the best ways for managing complaints and can lower the incidence of complaint-worthy issues overall. "There is clear evidence of change in reporting behavior over the last five years for our clients with hotlines that permit employees to report human resource management issues. The implication from the data is that those companies moving with proactive programs...appear to have fewer reportable problems of these types of issues." ([PR Newswire](#). pg. 1) The employee feedback system can even operate as an indicator of other positive employee attitudes, as found by Rusbult and Lowery-- “Employees were more likely to exercise voice when they were satisfied, [and] had more invested in their jobs (1985).” (cited in Kassing, 1997)

Of course, telling employees that there is an “Open-door policy for complaints” and actually having one are two very different things. Even with an anonymous hotline, employees can fear to be identified. If there is a history of punishing those who critique the organization, feedback will be scarce to nonexistent. “Companies that intentionally create a "culture of candor" foster an environment where employees trust employers enough to voice complaints, says Steve Priest, president of Ethical Leadership Group, a Chicago-based consulting firm.” (Hirschman, p.52). Implementing a system where employees can have their say can indicate a willingness on the part of HR and management to listen, which can benefit both parties. A company culture that values input not only increases the likelihood of helpful input on internal processes and events but will encourage keeping employees. A “Fearless culture”, characterized as “Being able to speak up and speak against the status quo... possible only in a culture where there was no fear of retribution.” was one of the primary factors Stum found in employee retention. (1998)

In the past, companies interested in employee feedback have used surveys, email complaints, or hotlines with good results. A hotline or email system can also prove to be an excellent way to reach employees when the business is too large to oversee personally. “Ron Myers, senior HR manager at Cabela's, a 14,000- person outdoor outfitter based in Sidney, Neb., with more than 40 U.S. locations, says hotlines ‘measure the climate of your workforce.’ Cabela's hotline vendor responds to calls within 48 hours of notification, at least to touch base with the caller. Myers says the system ‘has been invaluable to us to know what's going on in the field.’” (Hirschman, p.53)

Hotlines are invaluable for large organizations but provide benefits to companies of all sizes. A factor in the success of hotlines is how the technology can provide a platform that complies with the principles outlined for effective complaint procedures—namely, accessibility, simplicity, independence, time-scales, acknowledgement, and confidentiality (Foster, 2007). Cabela’s hotline is a perfect example of all six of these principles. The hotline is easily accessed through any phone, and has hours that extend beyond the work day so employees who work overtime or have demanding schedules will be able to use it. Calling a phone number is easier than finding forms, filing a report, and figuring out where to deliver them. Instead of having an in-house operator, Cabela’s uses a vendor whose primary business it is to run employee hotlines—employees are not at risk of calling and having to talk to the very person who is causing them problems. As stated before, the vendor then will call back within 48 hours (an established time-scale for response), signaling acknowledgement of the complaint and the implication that the company is taking this issue seriously. The complaint is given a case number rather than a name, so confidentiality can be insured.

In order for any of these complaint systems to provide the benefits mentioned above, it is necessary for employees to receive feedback that they are being listened to. While the positive effects of having a perception of control are well documented, if complaints are not acknowledged the system runs the risk of backfiring. Employees can get the message that they are not being listened to, and will become even more jaundiced towards the organization as a whole. “Employees will not have faith in a grievance process unless they know it is taken seriously by senior management.” (Eubanks, p. 36). The best way to let employees know their complaints are being taken seriously is by acknowledging the initial registering of the issue and then following up with whatever action has been taken, or if nothing has been done, why not.

We hope that Twine will provide a more accessible system for complaints that will formulate the data in such a way that HR will be able to respond more efficiently and with greater effect. While formal grievance procedures are important for large issues, the smaller problems can be pushed under the rug with disastrous consequences for employee happiness and productivity. “Offering different reporting channels suits different employees' comfort levels, experts say. ‘You want to have different channels for different personalities,’ says Ruth V. Aguilera, associate professor of business at the University of Illinois at Urbana-Champaign. Employees who are introverts, for example, may feel more comfortable with an employee hotline than a focus group.” (Hirschmann, p. 52) By implementing varied complaint procedures, employees will be able to make themselves heard in whatever way makes them feel most comfortable and at ease.

OUR SOLUTION: TWINE

In order to address some of the aforementioned issues, we present Twine: a Human Resource tool to assess and address employee morale by analyzing trends from employee micro-blogs, more commonly known as “tweets.”

Why Twine?

The Twine system is meant to leverage the time employees use to do non-work-related activities, such as “workplace Internet leisure browsing” or WILB. In most cases, employers discourage WILB as it takes time away from work the employee is meant to be doing, however, there is at least one study suggesting that productivity increases if knowledge workers take some time to rest, and then refocus on their work-related task (University of Melbourne, Department of Management and Marketing, 2009). Nevertheless, whether the employer sees this time as unproductive or in the frame as the aforementioned study, this WILB does take place and, if given meaningful context and analyzed correctly, is a valuable resource for assessing a corporation’s HR status.

One of the WILB activities in which employees partake is microblogging, more commonly known as “twittering.” User of microblogging sites, such as Twitter, broadcast an announcement to a list of “followers” or people who are allowed to see these messages. The messages usually contain a current thought or a description of what the user is doing at that moment.

Microblogging is an extremely popular online activity. Sites such as Twitter host an average of anywhere from 1 to 10 tweets per user per day. However, Twitter is just a popular outlet representing one larger human need: to be heard. Twine offers a constructive outlet for this need, which can in turn be utilized by HR staff to assess morale corporation-wide.

There are a few existing services that touch on this subject of large-scale microblog analysis. The first is yammer.com which attempts to connect people within organizations using existing twitter.com accounts. The next, tweetscan.com, uses the twitter.com API to search tweets for a user specified term. The last example, and perhaps the most sophisticated twitter accessory examined here, retweetradar.com, analyzes tweets from twitter.com in real-time to find trends in what people are talking about. Twine combines the best parts of each of these, and adds a bit of linguistic analysis to make employee microblogs useful for HR.

Employee Centricity

One of the reasons some HR departments cannot respond to brewing personnel issues as they arise is because employees do not come to them with their grievances until the matter has reached a boiling point. Either employees do not feel comfortable speaking up, or they lack an acceptable way to make their feelings known. "Employees articulate their dissent when they believe they will be perceived as constructive and their dissent will not lead to retaliation... Articulated dissent involves expressing dissent directly and openly to management, supervisors, and corporate officers." (Kassing, p. 324) Many times there may be indicators of a potential issue, but due to the large size and reach of large corporations it can be difficult to pick up on these

cues or even allow outspoken employees the opportunity to talk to "management, supervisors, or corporate officers". In some cases, employees vent frustrations to other employees to alleviate work related tensions, while in others take to the net a post tweets such as this one found on Twitter: "Why oh why must I always come into a freezing office in the morning?! I actually bring a coat to work not to wear from the car to the building, but while I'm sitting at my desk." Perhaps if comments like this were directed to the appropriate resource, the issue would be addressed, but instead many times the only evidence of such an issue is an instance similar to the aforementioned tweet.

Another reason employees may not report a relevant issue to HR is due to fear of repercussions or not wanting to bother HR with what could be seen at the time as petty concerns. Twine is designed to address both these issues by providing employees anonymity with any submission to the system and encouraging any type, quality, or quantity of submission. By making submissions to the system anonymous users are protected from "real life" consequences (to a degree; a topic that will be touched on later) from their legitimate concerns. Any submission made to Twine gives a clearer view of how employees are feeling about their work environment; everything from "It's hot in here today" to "I can't believe they slashed our 401k again!" is a valid contribution representing the mindset of a corporation's workforce and can be used by HR to build actionable plans to address any relevant issues.

How Employees Tweet

The first component of Twine is client-side interface that promotes and encourages twittering but not so much that it interferes with the employee's normal work. A small, unobtrusive application is added to the employee's computing environment which elicits tweets by displaying "What's on your mind?" message after a prolonged period of inactivity. Additionally, the employee may tweet at anytime by activating the application.

Once activated, the application provides a text box for the employee to supply a tweet limited to 140 characters. Upon completion of the tweet, the employee has three options for submission: submit as a positive tweet, a negative tweet, or a neutral tweet. In most cases Twine can determine this attribute by itself, but for ambiguous tweets this helps ensure issues are given the proper weight (more on this later).

Upon submission, the employee is presented with a confirmation message of their submission and a "quick list" of related tweets (if any). This list of related tweets is prefaced with a message of "Judging from the content of your submission, you're not the only one who feels that way:". The list will not be interactive, just a static listing, and is not meant to provide the deep social capabilities of a more "open" system (in order to protect privacy and as to not provide a means for work-related distraction) but rather just a nugget of information to let the employee know that they are making a valuable contribution to the system which will be counted and heard. While automatic, this system generated message acts as acknowledgment of the complaint (Foster, 2007) and generates the rewarding response of seeing what/how others are doing and feeling, a psychologically fulfilling activity that fosters a sense community (Kassin, Fein, & Marcus, 2007).

How it Works

The mechanics of Twine are centered on analyzing, scoring, and relating each Tweet provided by a corporation's employees. The goal of analyzing each tweet provides a basis for severity and either new or existing issue relatedness; that is, at this stage the system is attempting to determine how happy or mad the employee is, and if the tweet they submitted is related to other tweets their fellow employees have submitted.

Once a tweet is submitted by the user, it undergoes three analytical stages: assess positive/negative attribution; parsing text; and scoring. During each stage, Twine uses a series of linguistic algorithms to meaningfully determine the tweet's content.

Assessing Attribution

During this first stage, Twine attempts to determine if the tweet contains positive or negative content. This assessment is heavily based on which button the employee pressed to submit the tweet (positive or negative), however Twine also does its' own assessment to ensure the employee entered attribution. This is largely done to correct inadvertent or malicious attributions that would affect ratings later on.

Correcting Spelling

In order to ensure each tweet is given the proper score, Twine must first correct any spelling errors present in the tweet. The correct spelling of words becomes important when Twine attempts to relate the tweet in question to others already present in the system.

Scoring the Tweet

During this stage, the tweet is analyzed in terms of its severity and its relatedness to other tweets. Various linguistic algorithms that judge word proximity, word frequency, word semantics, and punctuation are utilized to determine the tweets severity rating and its' issue relatedness score.

The HR Dashboard



Figure 1: The HR Dashboard gives an at-a-glance overview of various organizational details.

Once the immense amount of aforementioned microblog data is accumulated, a convenient, intuitive method of evaluating that needed is needed. For this reason, Twine incorporates a visualized dashboard consisting of four graphs which aggregate employee microblogs and presents them through the use of four interactive graphical representations: company health; issue volume; issue relatedness; and issue longevity tracking. HR employees can quickly discern the number of pleased, or displeased, responses and can take action on those issues by expanding the visualizations to show more specific information.

The *general health* of the organization is displayed as a pie chart that depicts the health, which is an amalgam of the positivity and negativity, of all incoming tweets. They are broken down into positive, negative, and neutral comments. This lets HR quickly see how the employees of the organization seem to feel as a whole in real-time. Each pie slice is interactive and promotes clickability. Once clicked, the HR user will be taken to the details that compose that segment. Here they can read individual tweets and get a better idea of what their employees are talking about.

The next visualization, *issue relatedness*, is useful because it allows HR to track issues based on size and relativity to other issues. In order to measure empirically the relatedness of issues, or topics, the system will calculate semantic relatedness of the constituent words in the received responses. The data is then segmented by date or week or any other meaningful measure of time. This allows an organization to discern if topics converge over time or if they appear in isolation abruptly. On the graph, the size of a bubble represents the volume of responses that are within topicality of an issue. The bubbles themselves are proximally located based on semantic relatedness to other topics. For example, a bubble may represent the topic of "Project Valkyrie" and any responses concerning this topic will be within the dataset of this bubble. The bubble itself may be close in proximity to the topic "Project Twine" since it is semantically similar. This will be useful for HR representatives when smaller issues are gaining popularity and need to be addressed, but are all linked to one central issue. In this case, addressing the core issue will likely resolve related issues.

Issue volume is represented as a histogram that displays various issues and the number of positive and negative tweets related to it. Issue prevalence is perhaps best understood by discerning volume of response accrued over long durations of time. To this end, the Issue Volume visualization takes the form of a bar chart split into red (frustrated) and green (happy) responses for the most frequent issues. In our example, the issue of "Appraisal" has the highest volume and is about 60% positive and 40% negative. Further information can be ascertained when the bar for an issue is clicked.

Lastly, the *issue longevity* tracking visualization supplies HR with a time-line and volume index graph for any number of selected issues. From here they can determine if their efforts are helping resolve issues over time. The graph's trend lines will directly indicate if the issue is getting better or worse and how it behaved historically.

The combination of these visualizations on the HR dashboard will help HR representatives quickly identify inter-organizational issues and rapidly develop plans to address pertinent or widespread situations. Please see the appendices for additional mock-ups.

How Big is Big Enough?

In order for Twine to be useful for HR departments, a large contributing user base is necessary. Many of the aforementioned visualizations on the HR dashboard would not be very useful if only a small number of tweets were submitted everyday. Also, HR departments within companies who have relatively few employees, all of which a centrally located, may not need such a “heavy” system to monitor what they can hear just by walking down the hall to the break room.

For this reason, it is recommended that Twine only be incorporated within organizations with 500 or more computer-using employees. An organization with this many employees might have problems pinpointing issues of importance to employees, where as smaller organizations may not. Also, in an organization with 500 or more employees, even if only a fraction of employees contributed content to the system there would be a statistically significant sampling of employees to represent a wide range of issues.

Abusing the System

Of course, with user-generated content there is always the chance that one or more users will abuse the system. In the case of Twine, users could submit a large number of tweets to essentially “vote up” and issue and therefore give an inaccurate assessment of its severity to those in HR. Additionally, disgruntled employees could use this platform as an anonymous soapbox to defame their peers or management without repercussions.

To prevent the abuse of the system a user policy will be presented to would-be Twiners to discourage unproductive submissions, and a moderation platform will be available to the HR department to restrict, warn, and block users and tweets.

Twine depends on the professionalism of each of its users to produce a credible and useful view of an organization's HR situation. When employees see the value of submitting quality contributions to Twine (e.g. issues are resolved) abuse of the system will likely be kept at a minimal level.

Voices Heard

In order to ensure continued valuable contributions to Twine, it is important to demonstrate to employees that their tweets are being heard and contributing to a higher quality work environment. For this reason, a bi-weekly e-mail is sent out to participating and interested employees regarding hot issues from the past two weeks. The e-mail show the same visualizations that HR sees on their dashboard, but will only contain data for the past two weeks.

The presentation of information to employees in this manner allows those who have contributed to Twine to see where their concerns ranks among others, to know that their tweets counted towards volumizing existing issues, and to give them some visibility as to what other issues are present within the company. Keep in mind that contributions to Twine are just as likely to be positive as negative, so this weekly e-mail can serve as a positive and negative constructive setting for company-wide morale and issue awareness.

BUDGETING

Budgeting for this new company implementation is fairly simple. The initial fixed cost can be seen in the table below, and then the ongoing cost would be a simple reassignment of duties. The annual fee to run this software is a minimal \$185 per year. So, for a nominal fee, you can keep a close eye on all of your employee's smallest complaints and problems.

Initial installation	\$10,000 - \$30,000 based on size
Computer software	\$25 per computer - fixed cost
Management / Human Resources Training	A redistribution of responsibilities, covered in installation cost
Employee Training via use of downloadable videos	Part of computer software
Ongoing updates / maintenance / IT Governance / Bugs	Lifetime Support is provided free of charge
Yearly fee	\$185 per year or \$15 per month

Table 1: Twine is adaptable to organizations both small and large.

RETURN ON INVESTMENT

The biggest return on investment will be a happier, more cohesive company that looks after the thoughts and concerns of its employees. By having someone listen to and take care of small problems that often go unmonitored; the possibility of these small problems turning into something bigger is reduced exponentially. By reducing or eliminating these problems, we are going to have a happier staff. A happier staff will lead to more productivity in the workplace, and more productivity will lead to higher profitability!

By monitoring your employee's wishes, you can create a better place for them to work each day. "People want to create value for other people - that's where self-esteem comes from." (Lewis, 1996, pg. 82) Good managers want to motivate their employees to do the best work possible. However, for larger workplaces, where employees do not have easy access to upper management, this will be a way for them to communicate their comments and frustrations. By being attentive to their employees concerns, it will create a better atmosphere within the workplace for both management and employees.

By having anonymous submissions, that are both easy to do and take very little time, employees will be more willing to talk about what is bothering them in the workplace. By giving employees a place to vent their frustrations, employees are more likely to keep management informed with what is making them dissatisfied. Shy and introverted employees will be more likely to submit his or her frustrations through an anonymous method of communication rather than having to confront his or her boss or supervisor with concerns that may seem trivial or unimportant.

MITIGATION OF RISK

While we believe Twine is a great enterprise solution, some precautions need to be taken in order to mitigate risks. The employees' should use Twine as supplemental method of voicing their concerns for issues that do not require urgent attention. For urgent issues it is important for employees to be aware of the organization's formal grievance procedures. Twine is meant to be a useful but informal channel for employees to voice their opinions. Just as water cooler discussions do not legally constitute documentation for a serious charge, Twine is not designed to replace the more formal procedures.

Twine is a very powerful tool; if used properly it can raise the productivity of your organization. However, it is the organization's responsibility to make sure that their employees are using Twine in a non-disruptive manner.

CONCLUSION

Having an employee complaint system in place is a simple, effective way to increase employees' happiness on the job, their commitment to their workplace, and increase talent retention. Companies will benefit from early warning of problems, small and large, while also gathering an "on-the-job" perspective. Workers' real priorities will become known, helping the organization to meet the needs of its workforce. employees are inherently "predisposed to voice...they have increasing desires to voice as these opportunities become available...and have found that voicing their opinions leads to sense of accomplishment (Sprague & Ruud, 1988), greater satisfaction in the workplace, and more commitment to organizations (Gorden & Infante, 1991)." (Kassing, p. 311)

Twine is a straightforward and efficient way of giving employees a voice at work. The format of Twine is intuitive, familiar to those who use microblogs and easy to learn if one doesn't. The data collected by Twine is processed by the system to reduce the man-hours that needed would be necessary to review the complaints, yielding up parsible data for those in HR. Powerful visualizations allow HR-side users of the system to follow trends over time, complaints by issue, even general workforce morale. In conjunction with a (separate) formal grievance policy and clearly stated policies for moderation, Twine can act as an asset in capturing the minor complaints that negatively affect the workplace but that formal grievance procedures overlook.

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APPENDIX A

Additional Mock-ups

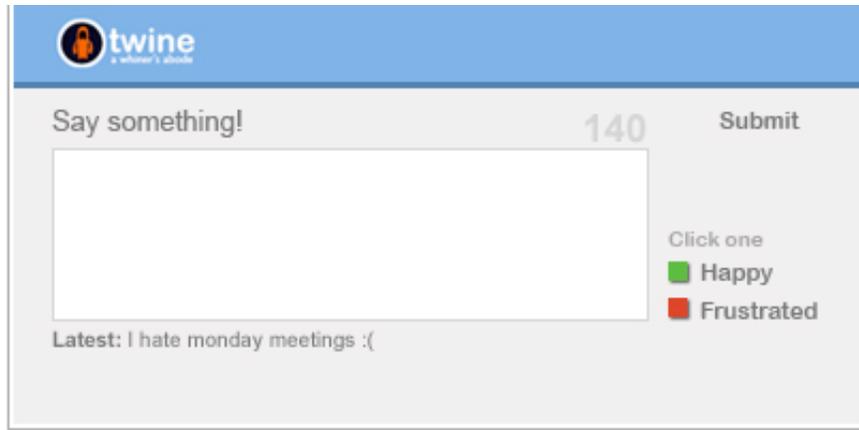


Figure A₁: The Employees' Interface

Employees must contribute to the Twine system by inputting comments and to this end our mock-up interface allows users to quickly contribute. Indicating that a contribution is “happy” or “frustrated” is useful for data analysis but is not required. All contributions are anonymous to protect employees and instill confidence.

twine
a whiner's abode

Search the site...

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You are logged in as [Lynda Kelly](#).
[Account](#) | [Help](#) | [Sign Out](#)

I like the plants they put on the hallway; i wish they also put some soft music on the aile. My days at office will be a lot more better then. ■
4 minutes ago from Desk
[Watch this whiner](#) [Type a Tag](#)

I hate this time of the year - these appraisals are meaningless; we fill so many forms but nothing happens after that :(■
25 minutes ago from Desk
[Watch this whiner](#) [Type a Tag](#)

There are worms near the water cooler - my boss should not hate me if I fall sick; better they change the water cooler now! ■
about 1 hours ago from Desk
[Watch this whiner](#) [Type a Tag](#)

I have been waiting for the new version of Visual Studio for last one week - they should not blame me if the project is delayed :(■
about 3 hours ago from Desk
[Watch this whiner](#) [Type a Tag](#)

I like the new cafe ■
about 3 hours ago from Desk
[Watch this whiner](#) [Type a Tag](#)

Sometimes meetings are very good: you need a legitimate reason of not producing work on time :) ■
about 4 hours ago from Desk
[Watch this whiner](#) [Type a Tag](#)

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Status

■ Neutral 219
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Figure A₂: The HR Tweet Feed

While data analysis is undoubtedly useful, HR may also wish to examine individual Tweets to organically respond to comments. This feed allows the viewer, likely an HR employee, to see Tweets as they are submitted to Twine. One is also able to search for tags and see the general health of the organization depicted in the pie chart.