
Taskville: Visualizing Tasks and Raising Awareness in the Workplace

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Abstract

Taskville is an interactive visualization that aims to increase awareness of tasks that occur in the workplace. It utilizes gameplay elements and playful interaction to motivate continued use. A preliminary study with 37 participants shows that Taskville succeeds at being a fun and enjoyable experience while also increasing awareness. A strong correlation was also found between two major study groups demonstrating its potential to increase awareness and stimulate task-based activity across work groups.

Author Keywords

Visualization; collaboration; design; reflection

ACM Classification Keywords

H.5.2 [Information Interfaces and Presentation]: User Interfaces; H.5.3 [Information Interfaces and Presentation]: Group and Organization Interfaces

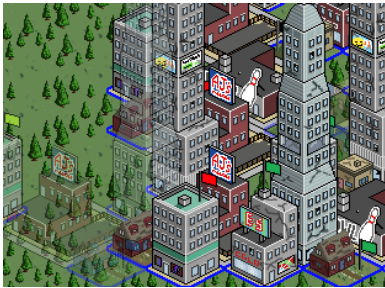
Introduction

In today's economy, many large companies are diversifying their products and services in order to stay relevant and meet the demands of emerging global markets which necessitate numerous large, diverse, and distributed teams working on various projects. The rapid advancement and adoption of information and communication technologies has made it easier than

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Zoomed-in view showing "ghosted" buildings due to user inactivity (left), as well as buildings deteriorating due to an unbalanced work-life ratio (skyscraper at right).



A closer view of the tag cloud, displaying a summary of the tasks that have been submitted to Taskville.



Figure 1. The main Taskville visualization. As users submit tasks to the system, buildings parachute down into the city. Colored flags indicate the owners of the buildings. The mayor, deputy mayor, and city council members shown on the top-right identify the users with the top four scores in that city. A mini-map in the lower-right shows the relative sizes and positions of each of the cities.



ever to coordinate these different groups. These technologies also allow workers to adopt flexible working schedules [11], challenging the traditional, Western "9-to-5" workplace mentality in which individuals were expected to do most of their work physically at the office during certain hours of the day.

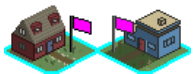
These factors enable work environments to be increasingly decentralized. In such situations, the individual worker may lack an awareness of the range of activities within the organization. This lack of awareness can be further compounded by factors such as the team's size or the project complexity. Additionally, the individual may not see the influence of

their own contributions on the team, potentially engendering feelings of isolation. However, prior work has shown that awareness is an important prerequisite for successful coordination [6,10].

To address these issues, we present **Taskville**, an ongoing project [12] that aims to effectively raise worker awareness in a manner that is engaging and fun. Taskville is an interactive visualization that uses a city building metaphor where teams are represented as individual cities within a larger region. The cities grow in size as workplace tasks are completed, and gameplay elements are incorporated to encourage continued use. Taskville provides several mechanisms

Hard Hat Zone

A look at the buildings that can be found in Taskville.

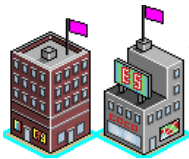


House

Small houses given for tasks taking 1 – 3 hours.

Shop

Given for tasks taking 4 – 5 hours.



Skyscraper

Tall buildings which are given for tasks that took more than 5 hours to complete.

Large Buildings

Fun multi-tile buildings given for completing tasks with other users.



for an individual to view, at a glance, their workplace contributions alongside those from others in their team.

Related Work

Gamification explores the incorporation of game design elements into non-gaming contexts [4]. Examples of gamification applied in workplace settings can be found in [3] (system administration) and [13] (monitoring).

Visualization of work activity and awareness information has been previously explored in the context of software development [1,8] and time management [7] scenarios. Others have explored the use of group activity visualizations in classroom settings [9], and the incorporation of gameplay elements into interactive visualizations has been discussed in [5]. However, Taskville differentiates itself from this work in that it provides a generalized overall view of organizational activity at multiple levels.

Welcome to Taskville

In Taskville, a large organization is represented as a flat, forested region. Populating each region are cities which designate various project groups within the larger organization. Each city has “citizens” whose real-world counterparts contribute buildings to that city by submitting tasks, where a task is defined as any activity which takes some amount of time to perform. Beyond that guideline, users are left to make their own determinations of what constitutes an appropriate task.

When a city is first founded in a Taskville region, it only consists of a city hall building. As individuals complete tasks, they submit them to Taskville, and each work related submission causes a building to parachute into their city. The information provided when submitting a

task includes the duration spent working on it, the users who collaborated on it (if any), and optionally, a brief description of what was accomplished. The specific type of building that appears is determined by the time spent on the task and the number of collaborators who worked on it (refer to the “Hard Hat Zone” sidebar). Users can also submit personal tasks, which do not create new buildings, but help maintain existing structures and prevent them from decaying.

Visual Design

The visual design of Taskville uses a style of 2D pixel art which is reminiscent of older isometric city-building PC games such as SimCity 2000 or Caesar II. The visual interface is designed in a way that allows users to quickly become aware of a large amount of information with just a passing glance. Buildings belonging to the same user are clustered together into neighborhoods which are identified by colored flags; therefore, users can quickly estimate their contributions to a group by comparing the size of their neighborhood with those belonging to other users.

A building’s height and area also inform a user about the relative amount of time it took for a task to be completed. Taller buildings are an indication that the task took longer to complete, while buildings with larger areas are an indication that the task has many collaborators. Each building also has other distinct visual features that impart information about the user. For instance, if a user is inactive, that user’s buildings will gradually become transparent, demonstrating their fading presence in the group. This visual cue makes individuals aware of who has been absent from the workplace over a long period of time. We have also introduced a work-life balance feature to Taskville;

buildings will visually crumble over time if too many work tasks have been submitted. To restore and maintain their buildings, users can submit “personal” (non-work-related) tasks. Finally, submitted task descriptions are formed into literal tag clouds which float across the virtual landscape. These provide a glanceable overview of what each group is working on, promoting awareness while preserving privacy.

Viewing and Submitting Tasks to Taskville

Taskville is best presented on a large screen display and is designed to be situated in semi-public spaces within a workplace, such as in a lobby area or entranceway. Placement in these locations ideally attracts glances from passersby and generates “water-cooler” style conversations. However, feedback from pilot studies [12] indicated that individuals desired the ability to view their cities in other locations beyond the public display. Consequently, we created a web interface for the visualization which also serves as a means for users to submit their tasks, and provides users with access to additional awareness information including their activity history and personal statistics.

Gaming Elements

Taskville contains light gaming elements which help make the system fun and motivates continued use [14]. Most prominent is the scoring system. Each submitted task receives a number of points proportional to the time spent on it, and individuals can gather more points by unlocking achievements. These can be unlocked, for example, by constructing a certain number of buildings in a day, or working on special days such as Halloween. This point-gathering framework encourages light competition among users as the top four users of each city are awarded the title

of mayor, deputy mayor and city council members respectively. There is also an implicit competition between groups/cities, who often vie to become the largest. These competitive elements serve as a fun motivator for individuals to continue submitting tasks.

User Study Design

To investigate Taskville's utility and perception within collaborative groups, we conducted an exploratory user study over a 4 week period at a major university. A total of 38 participants were recruited from 5 groups. Three groups consisted of undergraduate students in distinct courses, and these groups were offered extra credit to incentivize participation. One group consisted of graduate students co-located within a building and the final group from a research lab which the authors are affiliated with. This included two of the authors. This latter group assisted with preliminary testing of the system. Up to 10 \$20 checks were offered to these groups as compensation. A small number of individuals had used previous iterations of Taskville. Participants were asked to use the system and to complete a series of surveys throughout on perceived workplace activity.

Preliminary Study Results and Discussion

One group was omitted from the results due to having only one participant who contributed 3 tasks. From the remaining participants, 37 of those used Taskville at least once and contributed a total of 963 tasks over the 4 weeks. 651 were work related tasks while 312 were personal. Table 1 shows the distribution of users per group. The high rate of task submissions suggests that Taskville was highly usable and fostered continued use. In examining the number of work tasks submitted per day across groups, graduate student groups (G1 and G2) were found to be highly correlated ($r=.57$, $p <$

Group	Undergrad/ Graduate	N
G1	Graduate	9
G2	Graduate	8
G3	Undergraduate	13
G4	Undergraduate	7
Total		37

Group	Total # Tasks	Avg. # Tasks / User
G1	205	22.78
G2	508	63.50
G3	131	10.08
G4	119	17.00

Table 1. Top table shows the group distribution while the bottom table shows the number of tasks per group and the average number of tasks submitted per user.

.05). A moderate correlation was also found between the two graduate groups and G3 ($r=.34$, $r=.31$), but it was not statistically significant. This suggests that visible and active use of the system provides impetus for other groups and users to participate, and that the game elements encourage competition across groups.

An online, post-study survey was administered and 14 responses were received. Incorporating the System Usability Scale [2], this survey examined experiences with Taskville as well as its usability. Taskville received a mean score of 88.75 (SD: 8.59, N=14) out of 100 indicating it to be extremely easy to understand and use. On a 5-point Likert scale, it was also found to be fun to use (M: 4.50, SD: 0.65) with participants strongly expressing that they would use it again in the future (M: 4.71, SD: 0.47) and recommend it to others (M: 4.57, SD: 0.51). The results also show that Taskville helped some individuals be more internally aware of the amount of work that they do (M: 4.14, SD: 0.95) and is a motivator to complete work (M: 4.00, SD: 0.88). The free form responses further corroborate these findings. Users reported that they liked the ease of use of Taskville with one individual commenting that they "[...] loved how simple it was to use and how fun it was." Most users also enjoyed the light competitive elements: "I enjoyed the competitive aspect of it. There were definitely different moments with collaborations during the study in which the tasks were discussed in terms of the implications they would have for points [in our city]." That same user also commented that Taskville "[...] helped me stay focused and motivated me to complete work."

Users also indicated that several aspects of Taskville could be improved upon. While Taskville was successful

in raising awareness on the *amount* of tasks being completed, the survey indicates that Taskville failed to raise awareness on *what* tasks they were completing (M: 3.86, SD: 0.95) and what others were doing (M: 2.64, SD: 1.01). One user commented that "the [...] only way to get a sense of the tasks is through the word cloud but you have to wait for that to appear and it can take some time." This implies that new ways to present activity information that users can immediately see and grasp are needed. Some users also commented on the visualization becoming too cluttered and having difficulty finding their buildings. One user remarked that "most of the shorter-time achievements (houses) got masked by the longer term achievements [...]. So I stopped feeling like I wanted to enter things in unless they were major (long) accomplishments."

Although deeper investigation is required, the preliminary results are promising, indicating that Taskville fosters workplace motivation and awareness. With additional modifications, we assert it could serve as a highly effective awareness and productivity tool.

Future Construction

We plan to conduct a large scale, longitudinal study to evaluate the influence of Taskville on workplace awareness and other behavior. We also anticipate conducting a study in a traditional corporate environment where Taskville is intended to be situated. Feedback from the surveys shows that most users would like Taskville to become even more game-like with deeper and more nuanced mechanics. One user suggested that Taskville "should be able to do things [...] besides adding houses." A popular request for future iterations includes more features for customization, specifically for building appearance.

Users also stated that they would like indicators of collaboration between project groups/cities such as connecting highways, and we are also investigating ways to represent task hierarchies such as having buildings representing larger tasks that are gradually constructed from smaller sub-tasks.

Conclusion

We have presented Taskville, a serious game for the workplace which visualizes productivity as an isometric city landscape. It offers large, diverse, and distributed teams opportunities for improved awareness and coordination through playful interactions. Preliminary findings show that participants find Taskville fun to use and that it can positively affect motivation and awareness of one's own contribution within a larger infrastructure. A longer-term study is required to validate these preliminary findings.

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