INFO290 Social Computing Class Project
Task-Management Game

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ABSTRACT

> **Marlin**: [*Surrounded by jellyfish*] “This is bad, Dory. Very bad.”
> **Marlin**: “Dory, listen to me. We're going to play a game.”
> **Dori**: “A game?”
> **Marlin**: “Yeah, a game.”
> **Dori**: “I love games! Pick me!”
> **Marlin**: “We're gonna race. First one out of the jellyfish wins.”
> **Dori**: “Out, got it!”
> **Marlin**: “Rules, rules! You can't touch the tentacles, only the tops...”
> **Dori**: “Something about tentacles, got it.”
> **Marlin**: “No, it's not something about them, it's all about them.”
> **Dori**: “On your mark, get set, go!”
>
> - Finding Nemo 2003

There will always be situations where one must complete work, chores, or some other duty or obligation that is neither fun nor enjoyable. In the movie “Finding Nemo”, Marlin and Dori find themselves in just that sort of situation. The two of them are surrounded by a swarm of jellyfish, and both of them are highly unmotivated to escape the situation for fear of accidentally running into the jellyfishes’ stinging tentacles. Marlin motivates himself and Dori out of the situation by turning their escape into a game, where the objective is to race out of the swarm while avoiding certain obstacles (the jellyfish tentacles). The outcome is that they quickly escape the swarm, while suffering less emotional (and in this case, also physical) pain.

When people are faced with a task they are not motivated to do, many negative consequences can result, such as procrastination, inefficiency, boredom, falling behind schedule, low-quality work, bitterness, despair and general unhappiness. These problems face

individuals as well as organizations. How can one motivate an individual to do tasks that they are unmotivated to do? We propose that it is possible to build a mobile application for task-management that incorporates game elements, which will motivate individuals and groups to accomplish certain tasks with higher efficiency, productivity, and enjoyment.

INTRODUCTION AND BACKGROUND

Information technology and information communication technology in particular are known to facilitate increased workforce labor productivity for firms and industries. We would like to harness that actuality to create a productivity-increasing application. Unlike simple to-do lists or project management software that exist primarily to mechanize task distribution, our tool aims to be more useful by addressing multiple layers that affect corporate performance. In addition to typical benefits of electronic task organization, our application will leverage learnings from research on several performance-affecting topics, such as collaboration, competition, the psychology of goal-setting, workplace social networking and successful virtual team dynamics.

The value of ICT in productivity has long been clear. As Brynjolfsson & Hitt (2000) state, "There is a clear positive relationship [between information technology use and corporate productivity], but also a great deal of individual variation in firms' success with information technology." (p. 31; similar findings by p. 18 Oliner & Sichel, 2000). Brynjolfsson & Hitt quantify that "two thirds of the step-up in labor productivity growth between the first and second halves of the decade [1990's]." In monetary terms, average annual contribution estimations of computer capital to total output usually "exceed $.60 per dollar of capital stock" (Brynjolfsson & Hitt, 2000). Matteucci et al. broke out the positive productivity contributions into subcategories and noted positive gains by information communication technologies in particular, among other

subcategories (2005). (See similar findings also in Byrnjolfsson & Hitt, 1995, 1996; Lichtenberg, 1995 - as cited by Byrnjolfsson and Hitt, 2000.)

Often times the completion of a task involves the participation of several participants. Introducing a social component can transform these tasks into something entertaining and motivating for the user, ultimately leading to higher productivity.

Goal creation is a common tool used to boost productivity (e.g. Steers, 1975). However, certain conditions of goal-setting approach can actually hinder instead of help productivity. Our application implements three ways to create the successful goal scenarios. Use of peer competition in group-centric individual goals is part of a work environment that fosters higher productivity (Crown & Rosse, 1995). Another element of productivity leading to higher goal success is when employees partake in the goal-setting themselves, rather than being handed pre-decided goals (e.g. Shalley, 1991). Third, goal-setting works better for simpler tasks than for more complex tasks (Latham & Yukl, 9175). We will incorporate these constraints into our technology in various ways. For example, providing only a few lines to describe the task and/or allowing only short-term goal-end deadlines will encourage the use of our tool for simpler rather than more complex tasks. Letting users input their own goals will address the second issue. Lastly, since the main premise of the application is to facilitate competition, the first concern is handled as well.

Pitfalls we hope to avoid include replacing intrinsic motivations with extrinsic ones, and also competing to the detriment of the product quality. For example, imagine a worker rushes to finish writing a proposal in order to beat another player, leading to a poor quality proposal. We will address this concern by aiming to keep the competition low-key, perhaps by having a playful interface and possibly allowing competitors or impartial third-parties to rate the quality of winners' achieved results.

Despite the wealth of knowledge around the interplay of peer competition, goals and productivity, many employers have no technological platform that allows their employees to coordinate such competition. Providing one would enable increased productivity with low fixed and marginal costs. Use of the application in the academic or personal arenas would lead to user self-esteem.

The social component

Our project is social at its core because it leverages social relationships to increase productivity. Unlike traditional methods of task management (i.e. Gantt charts, to do lists, calendars or reminder systems), the type of application we are proposing would promote

- building bonds with others through playful communication (i.e. smack talk)
- motivating through group-centric competitive psychology
- motivating through reputation, track records or badges
- creating social enjoyment in otherwise unstimulating tasks via interacting with others
- naturally increasing feedback and communication
- encouraging teamwork

APPLICATION DESCRIPTION

For this project, we will develop a mobile application that allows users (potentially coworkers or classmates) to define a task and select a list of individuals (Facebook friends, phone contacts, etc) to be invited to complete the defined tasks. A task is comprised by a set of milestones. When a user gets an invitation to participate in a task, the application will allow him/her to select which milestone he or she would like to complete. This feature will potentially induce them to select their milestones as soon as possible, since otherwise they will get the ones that no one else wants. Every time a milestone is completed, the player will see a

visualization on the interface displaying the progress of the task with this added accomplishment, that is, which milestones of a task have been completed. We believe that this visual representation of the task completion will motivate the users to continue working on the proposed task.

We plan to test our hypothesis by conducting a user study on our application with a pragmatically sized (on the order of 10) number of users. Conversely, we plan to collect a relatively large quantity of data for each user, including but not limited to rate of task completion, productivity, and perceived level of motivation.

We will have no dataset until after the application is rolled out. Instead, in this class, we will work on the development of an algorithm to suggest who are the best users to complete a particular task (based on their preferences, task completion records, affinity with the user, etc.).

The steps we plan to achieve include:

- Completion of a web/mobile application
- Conducting a user study of the web/mobile application in comparison to other traditional task management systems
- Data analysis on user study data to reveal whether the social features of the application do in fact contribute to positive gains such as higher morale or productivity. This stage may include iterative tweaking of the application design.

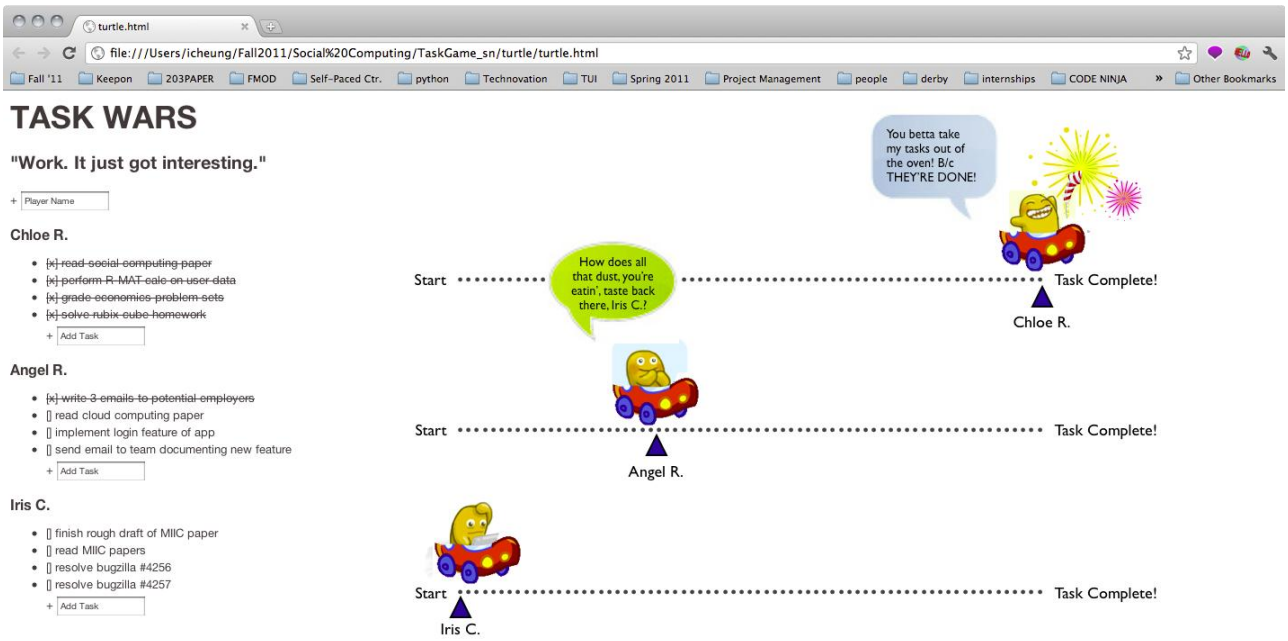


Figure 1. Web User Interface Mock-Up of a task-management game

In this mock-up, players race to complete their individual list of tasks. An animation of players driving in their own cars and racing to the finish line, updates with respect to each players progress. The speech bubbles represent a feature of the application which would allow the players to communicate freely to one another during the game.

MULTI-FACETED RESEARCH INFORMING APPLICATION DESIGN

We are doing additional research on which game or ICT features would maximize productivity gain. This research is informing our application design. Since the proposal phase of this course, we have learned that:

- Rotation of teammates on small projects lets employees learn others' strengths
- Virtual teams need teambuilding (p. 176, Gibson & Cohen, 2003)
- Technologies must be used to communicate with new people, not same old people in order to boost collaboration (Allen et. al., 1979).

Elements incorporated in our technology include competition, awareness-building of diverse coworkers and their specialties, and cultivation of particular skills and capabilities needed for virtual teams, and a collaborative social environment.

Brynjolfsson & Hitt speak to the role of IT in fostering collaboration. "The value of information technology (IT) in organizations is not in number crunching, but in IT's ability to facilitate new organizational processes. The productivity comes from creating new products, making incremental value additions to existing products, and/or cutting costs. All of these outcomes are improved by instilling a culture of disciplined collaboration" (2000).

Researchers indicate competition is a useful element in increasing productivity. "Transaction frequency and competitive activity represent distinct characteristics of knowledge markets, but they are positively correlated. Although strong competitive activity in knowledge markets may increase some managerial challenges (Gans and Stern 2003), it reduces NSH [Not-Sold-Here] tendencies" (Lichtenthaler et al., 2010).

Lichtenthaler's NSH barrier to collaboration is similar to Hansen's NIH [Not-Invented-Here' barrier (2009). The NSH/NIH barrier is reduced by our use the coworker discovery aspect of our game.

Collaboration is often required to maximize productivity in the workplace. And collaboration can be harder and harder to achieve in today's less hierarchical, more geographically spread out organizations. In his book 'Collaboration: Collaboration: How Leaders Avoid the Traps, Create Unity, and Reap Big Results', Hansen outlines four causes that can foil collaboration, and therefore productivity, in a company. When collaboration is needed, the lack of ability to be able to search for knowledge or transfer it between employees,

which are the ability barriers – and the willingness barriers of “not invented here” (strangers don’t want to cooperate with strangers) and hoarding barriers can appear, weakening company efficiency. While most IT tools aim to solve the search and transfer barriers, our tool addresses the willingness barriers (not invented here and hoarding). By making tasks fun and interactive, employees are participating in relationship building which lowers both the hoarding barrier and, especially, the not invented here barrier.

Allen et al. (1979) noted the importance social familiarity with the coworkers and an awareness of their expertises in achieving firm-wide labor productivity. Our application incorporates these needs by enabling coworker discovery through a ‘challenge a coworker’ invitational system. By the very nature of the work tasks as units on which competition is based, workers become aware of others’ functions and their specialties.

Virtual teams need explicit determinations of individual contributions to the team, alignment of virtual team efforts with the effectiveness of the firm (Gibson & Cohen, 2003). Given this and Hansen’s (2009) observation that virtual teams are becoming more common, our tool will be particularly valuable. It makes clear the individual’s contribution to the team. It also displays the team’s tasks with the larger firm’s goals.

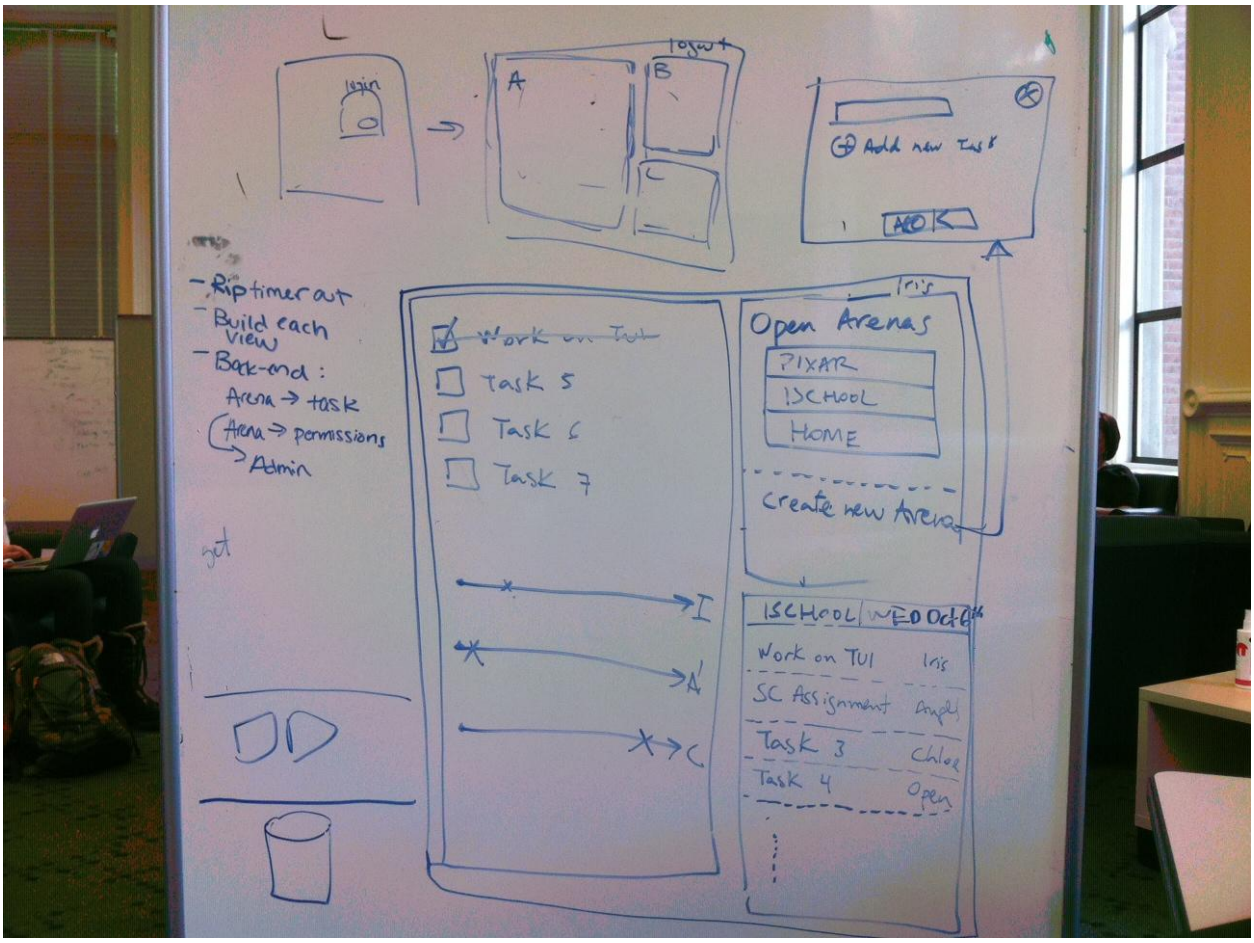
STATUS OF APPLICATION

We have built web user interface and backend that can accept an individual’s tasks. The layout of the page has a section for viewing one’s own queue of tasks, as well as all tasks of the groups one belongs too. This design assumes individuals may be a part of multiple teams at once (an employee may work in one or two departments and is allowed to be on multiple task forces). One is able to add, start, complete and delete tasks, though the complete

tasks function is in the bug-fixing stage of development. The website also has a login feature, which is fully operational.

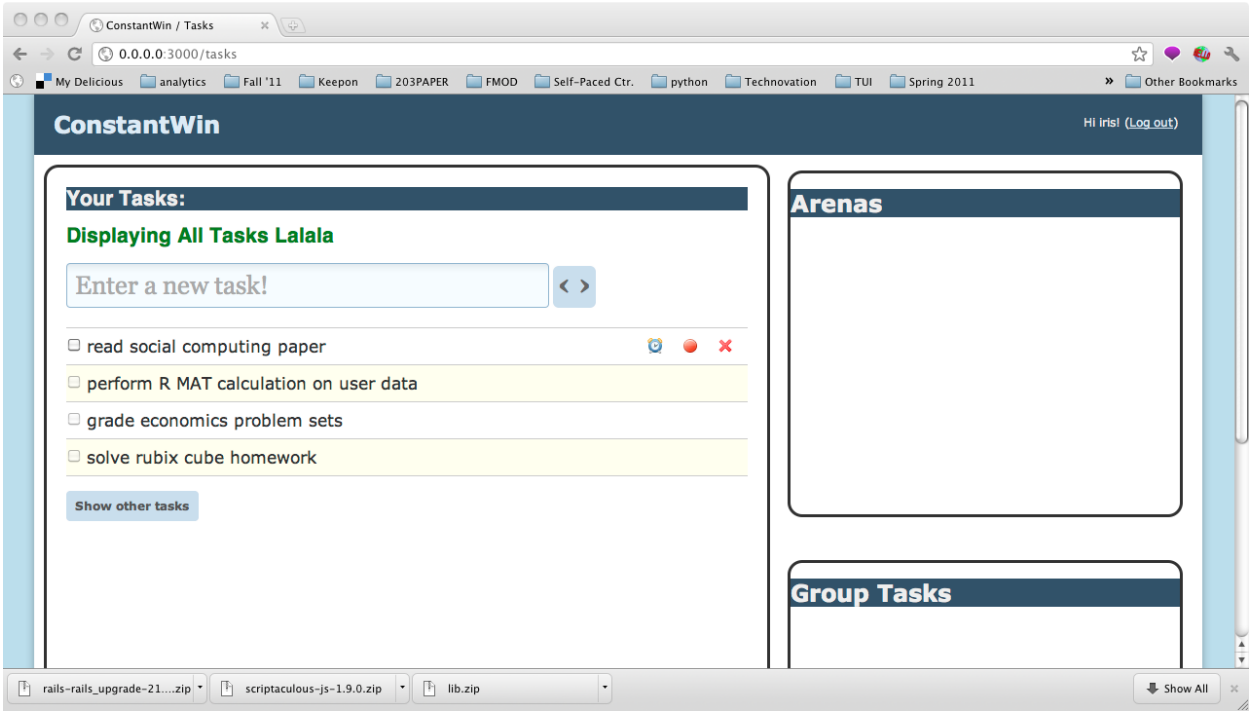
The images below depict our vision and the current status of our implementation of that vision.

THE VISION

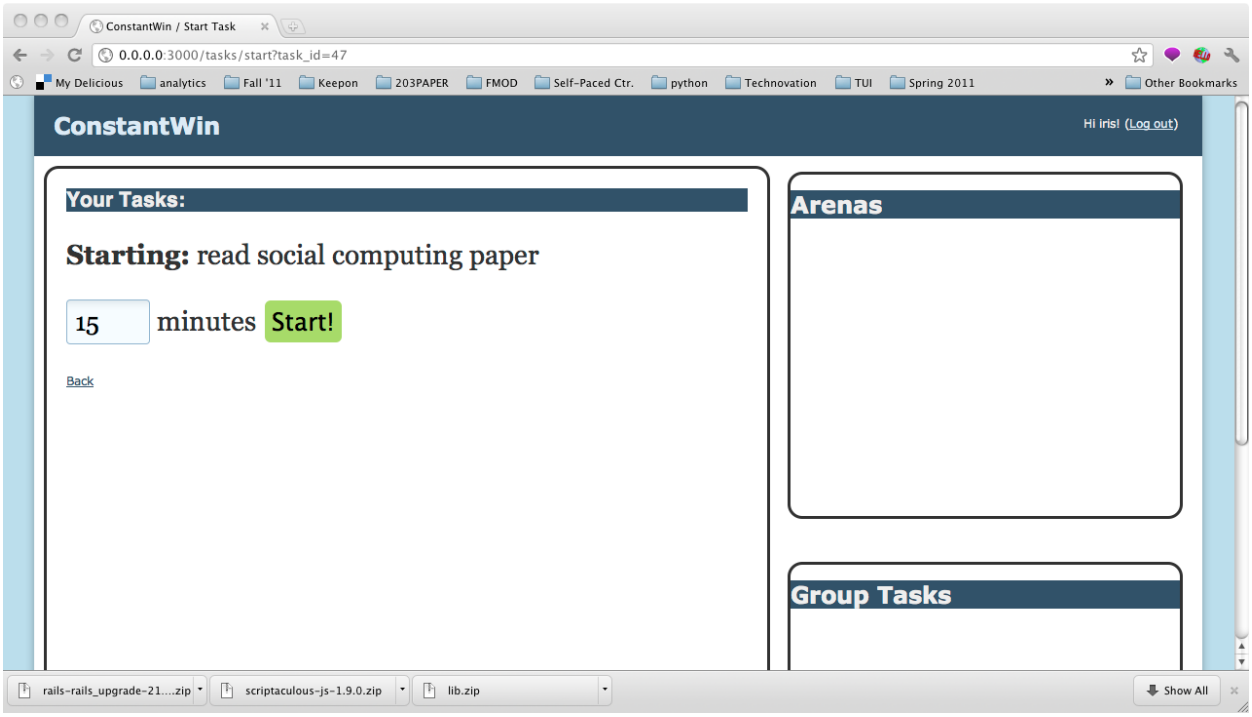


THE LOGIN SCREEN

THE HOME SCREEN



THE ADD A TASK SCREEN



Our plans before the final are to add the social component, to allow multiple players to interact (suggest tasks for each other and invite others to competitions). We want to rename the application (we have begun brainstorming new names). Also, we want to tweak the aesthetics of the interfaces. The home screen is divided into four quadrants. The upper right area lists the groups a person belongs to. The lower right box lists all the tasks belonging to those groups. The upper left quadrant lists the user's own individual tasks. The bottom left quadrant will contain the competitive component once the backend supporting multiple users is completed. The method for assigning tasks to others will be hosted in this quadrant.

SUMMARY

We believe that if users adopt this application they will increase their productivity levels. Some network effects will also be covered in the project; we expect the value of this application to increase as the number of users increases.

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