A role-playing-game approach to accomplishing daily tasks to improve health

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Abstract—In this paper we report work in progress on the design of a task scheduler that aims to assist people in choosing, scheduling and performing their everyday tasks. The main idea behind the proposed application is a role-playing-game in which the player must strive to evolve features he most desires for his character - to obtain the desired result. A key goal of our approach is guiding users to perform activities that provide more benefits to their health. One way to accomplish this goal is through collaboration - by stimulating people to share their practices, difficulties and action plans.

Keywords—task management; collaborative work; well-being; health; role-playing-game; persuasive technology

I. INTRODUCTION

People often find themselves too busy with the activities of their everyday life such as classes, work, gym and tours. With the large number of tasks that can be done during the day, people can end up forgetting to perform certain tasks that could only be done at a certain time, like answering an important email or attend an event. This large number of tasks and little time to do them may lead to the so-called social jetlag, causing anxiety, stress, loss of sleep and obesity [21]. Some people also end up neglecting activities that would be beneficial for them, either for their health, intellectual or professional development, among others [16, 17, 18]. For this reason, some people, worried about their health, seek ways they can assist in the control of their tasks.

To better manage their time, people can make use of tools like calendars that assists in managing the tasks that must be done on the day, as happens with applications like Trello, Google Tasks and Reverb. With the help of these tools their users can check, during the day, what activities they have scheduled for that day, making it harder for a person to forget that he or she had to do a particular activity. This helps in the first part of the problem that is forgetting to do important tasks, reducing the chances of anxiety, stress, depression and others that are part of the social jetlag. But merely managing the activities is not sufficient to guarantee that people will engage in activities that benefit their health. It is therefore necessary for this agenda to be able to guide users in their choice of activities that will provide benefits to their health.

Several approaches have been proposed and tested with focus on persuading people to change their habits in order to achieve an improvement in their health, quitting smoking [2, 7, 10], practicing physicists exercises [3, 9, 12, 13], among others [1, 4, 5, 8, 19]. However, these approaches are usually focused on persuading their users during the execution of some specific tasks but not providing a monitoring of how all these tasks are helping them to achieve their goals in the course of their day. This focusing does not guarantee the well-being of the user, because these tools do not take in count that during busy days, with a great number of tasks to do, if they do not know how to manage well their tasks, this scenario can cause them problems like stress and anxiety.

In this paper we propose a persuasive approach that consists of helping people schedule tasks in their day-to-day - selecting in a better way these tasks - in order to guide users to perform activities that provide more benefits their health. We also provide a way to stimulate people sharing their tasks among one another in order to maximize the collaboration between them and thus, helping them to complete their daily tasks.

II. BACKGROUND

2.1 WELL-BEING

According to Munson and colleagues [25], Social computing is perhaps the most promising opportunity for CSCW research to contribute to health and wellness. Social software can also help persuade people to make behavior changes that improve their wellness or that can help them better manage a chronic illness [25].

Due to the advances of technology, several facilities have transformed our eating habits and physical routines. Daily working hours sitting in an office chair, little time for lunch, eating at fast-food restaurants, are a few examples of practices harmful to health, but that may be present on the everyday lives of many people.

By noting this fact, some people worried about their health began to seek ways to maintain healthy habits. This concern prompted several studies to create mechanisms that help in improving the quality of people’s lives. To achieve this, many
tools can be created, from brochures to more intelligent mechanisms that require a change in one's life.

Some of these mechanisms are persuasive. They try, through the technique of persuasion applied, to guide the user to improve his habits. These improvements may be very different, depending on the focus of the tool: stop smoking [2, 7, 10], practicing more exercises [3, 9, 12, 13], among others [1, 4, 5, 8].

At each new study, new applications emerge, at least in research settings, to assist in improving the efficiency of persuasion in provoking better habits in people [3, 6, 11]. These applications often come bringing the knowledge applied in its predecessor and trying to fix some defects observed in their strategies. There are several other studies attempting to improve the people's quality of life, but we have studied them, identified points that can be improved and integrated a new set of tools for persuasion together in order to achieve our goal.

2.2 Games

Several games have emerged with the goal of teaching something to the player, called educational games, and even today games like these are still created, because they allow the player to learn something in a nicer way than just reading books on the subject.

However, with the deepening of the understanding of games, it was noted that they could do more than just teach about a subject. These games no longer have the primary goal of teaching, but using the entertainment as an approach to persuade their players to do some task, change the way they think about a certain subject or change their own behavior [4, 7, 12].

During the years of research on these games, some strategies have been experimented. One is the use of the development cycle of characters in a Role Playing Game (RPG). Studies say that when a person is playing an RPG, this person feels that, to achieve his goals in the game, he/she should evolve the features of his/her character, making him/her stronger, faster, smarter, etc [7]. This motivates players to perform tasks that could positively change the attributes of their character. The main idea is to make the tasks that the player will have to perform be chosen in a way that they act as a persuasive tool, helping the player stop smoking, save energy, weight loss, among others.

Within the set of games focused on health, a subset of these games focus on making players practice some physical activity during the game - as the "Nintendo's World Class Track Meet" in 1989, "Dance Dance Revolution" in 1998 and recently the "Wii Sports" in 2006 [20]. One problem with this approach is that the player is only encouraged to do physical exercises while playing. Another type of approach encourages users to do real physical activity in their day-to-day. Applications such as RunKeeper, iFitness and Endomondo [22], although not games themselves, have many characteristics of games to help stimulate the user, such as competition, reward, fun and developmental monitoring.

This latter approach made it possible that users could be encouraged to practice real physical activities outside their home. And besides, it is not expected for a person to continue playing the same game for years, even being an educational game or providing some benefit to his/her health, but to think that a person can stay for years using a tool that helps he/she track his/her physical activities seems quite reasonable. This is another feature that allows extending the usage time for the tool.

Section 4 describes how we use the technique shown above for, together with the tasks that the player must make in their day-to-day, encouraging players to improve health.

2.3 Task Management Tools

There are many different types of tools that help their users to remember and better manage their tasks. A very simple example is a notepad where the user can include activities he/she wants to remember to do. But in this example he/she will be responsible for all the organization's information inserted, because it will be text only, i.e. unstructured information.

Over time new tools were created with a separate space for the user to enter when he wants to perform each registered activity. An example of an application like this is Google Tasks where the user can select the date and time for the execution of each task. These applications can also rely on notifications (via email or SMS, for example) that can be set to remind the user to perform a certain task, when the present date is near to the one associated with the task. This helps the user since he/she no longer needs to enter the application to check if some activity is getting close to the deadline.

The next step in the evolution of these applications was to allow projects to be controlled, or in other words, a set of tasks with a certain order of execution and that these could be shared between users, so that each task could be performed by a different user. Examples of such tools are Trello, Reverb and Hitask. This allowed users to break complex tasks into smaller ones, which can be performed by many different users.

Given such evolution of this type of application, the next step is to ensure that the knowledge acquired in the planning of a project - or an "action plan" - is not lost and may be reused by other users, even if these users do not know each other. A study that exemplifies this is described in [24], where users can obtain action plans in a base of plans registered by a crowd of users. This acts as a persuasive tool, because when a person relies on other people to complete tasks, and these people rely on the former to complete their tasks too, this makes people paying more attention on doing their tasks. This study also highlighted that people often fail to plan, and accordingly to [24], "people who received action plans from the crowd completed more tasks than a control group that did not". They defend that, as the wisdom of the crowds has been used to solve many problems, such as deciphering words of a heavily blurred passage that is illegible by a single person, it can be used to produce concrete action plans and help planning more effectively one's daily tasks.
A concern related to such a tool arises to always keep users motivated to use the tool, registering action plans and sharing them, because without this, new users may not take advantage of the previous plans, and so the whole idea would not work. We will show in section 4 the approach we propose to keep users motivated and how to use these tools to improve their health.

III. RELATED WORKS

With the aim of explaining how the research line related to the proposal presented here has been developing and of showing that our approach seeks to mitigate the weaknesses of others, we will present two approaches proposed by previous works which use similar concepts like persuasion and RPG-based strategies.

The first study is the planning of the construction of a persuasive game that has the goal of encouraging the player to stop smoking, “Quit it!” [7]. This work has focused on the use of the development cycle of characters in an RPG, which consists of three steps:

- Perform actions using the character, in the world of the game, making him to obtain some kind of resource.
- Use the resources obtained to directly improve the character.
- Take other actions that may be more effective due to the more improved character.

By using these three steps, the player remains motivated to keep playing in order to improve more the character and therefore to be able to perform new actions or old actions in a better way. The attributes that the player can develop in his character are: fitness, strength and longevity.

In this game, the player guides the character to do positive actions to his health as physical exercises. As the player continues playing, his character becomes more “in shape” and can participate in new physical activities, and the game becomes more and more difficult for the character to participate in new activities. The opportunity to participate in new activities is the reward that should act as a persuasive tool for the player to stop smoking.

Barr [7] points out that the player can attempt to break the game system, causing his character to evolve, without necessarily quitting smoking.

Note that in this game the player controls a character in a fantasy world and this can cause a detachment of the evolution of the character with the evolution of the player in the real world. In other words, the success of the character does not mean that the player is succeeding quitting. Moreover, the paper presents the approach, based on comparative studies with the game Fable, but lacks a case study to prove that it achieves the objective.

Another work that we should include here is the study involved for the construction of Kukini, an application that aims to encourage its players to practice racing [20], measuring the distance and allowing sharing their performance, as well as the Nike + iPod. The latter work analyzes the so-called MMO RPG (Massive Multiplayer Online Role-Playing Game) and highlights some concepts used that were taken into consideration when designing their application. The player selects missions in the game world, which define that he must run a certain distance until a certain date. Then, through a device, the player must run in real life so that his race is included in the game. The game also has different areas, that will give the player different rewards, such as items for his character.

Among the key concepts are the micro-goals, which are objectives that can be achieved by players in a short period of time, generating a bonus and providing a means of achieving greater and more difficult goals. Another concept is the marginal challenges which are challenges greater than the proven player skills, causing him to strive more in the game to achieve better results.

Campbell [20] also points out that the Nike + iPod players can cheat in various ways in order to achieve an evolution of their characters without having to actually run - for instance, making another run for him or editing the XML file that stores the data of the races. And so the Kukini relies on global rankings automatically updated by the application. We believe that this does not eliminate the fact that the player can continue cheating, but it minimizes the problem and so we want to use this concept in our approach.

In this second work there is a focus on a very specific activity of the everyday life of the player. We view this as a weakness, because the player can leave the entire application aside, worrying about their other activities. Imagine a person having an application that helps in tracking her physical activities, another application to monitor the hours slept, another application for activities related to studies, and so on. It is not practical to have an application for each type of activity: first, it forces the user to enter, every time, in a different application, discouraging him; second, we cannot analyze the data of his or her activities on a consolidated basis. A more reasonable approach, therefore, would be if the user could manage, in a single application, his various day-to-day activities such as physical, sleep, work, study and others.

Just as happened with “Quit it!”; this second study did not present a case study of the proposed application, only the description of how it should work.

IV. DESIGNING MY OWN LIFE WITH THE HELP OF OTHERS: THE PROPOSED APPROACH

Once described the two approaches advocated by the studies presented in the previous section, the proposal we present here uses many concepts of role-playing-games to keep people stimulated on (keeping them) controlling their tasks and also focusing on the tasks that gives better benefits to their health. It also adds collaborative tasks by letting people share action plans with other people in order to keep them motivated and helping them complete their tasks more easily.

This approach aims to include the following characteristics in order to correct the weaknesses discussed above (table 1):
We have envisioned the proposed framework as a game to help control the actual activities that people should do during their day. This can be done through a task manager with alarms, notifications, signs and other visual elements that can help to draw the user's attention to the activities he should do. The player must include all his tasks in the manager application of which he would like to be remembered, specifying "when" he would like to receive notifications about each task. This will help to tackle the first part of the problem presented here, the forgetting of tasks that must be done by people. This helps to reduce the effect of social jetlag, mitigating therefore the likelihood that the user develops symptoms of anxiety, stress, sleep loss and other problems.

Moreover, it should also be possible that, at each task added, the player discriminates what benefit it generates for him (physical activity, intellectual activity, stress management, socialization and sleep). For instance, when adding an event "30 minutes of gym", the user can assign the attribute "+1 physical activity." The weight of the attributes will be set by the user according to the importance or difficulty of the associated task. These attributes will be useful in a later time, when the user is visualizing how their attributes are developing, he clearly has a sense of how the tasks he is performing are influencing his health.

Here we have a problem: each player can choose different attributes for the same type of activity. This difference between the attributes could generate distortions in the feedback shown to the player. Thus, we insert the following recommendation for use at the time of associating attributes to tasks:

- Tasks considered easy, which I do more than once a week, earn 1 point.
- Tasks considered moderate, which I've done before, but I do not always do and require more dedication, earn 2 points.
- Difficult tasks I've never done before and that is a challenge for me, earn 3 points.

These guidelines will allow users to classify more carefully the tasks according to their skills. Note that a person good at sports may mark a walk with 1 point, while a more sedentary person can score with 2 points. Although they are different scores for the same activity, it is desirable, since we want to encourage people to have better performances, which can be achieved faster with more challenging tasks, like in an RPG game.

The main idea of this approach, besides showing discriminately the benefits of each task, is to show these benefits through an interface similar to the game of RPG (Role-Playing-Game), where the player must strive to evolve features he most desire for his character, to obtain the desired result. This approach is expected to bring an experience that will encourage the user to choose tasks that bring more benefits to his health.

Like most RPGs, this approach includes the use of "quests" which are a set of tasks that must be performed in a defined order or not, but at the end of this the player is rewarded in some way. This system of "quests" aims to encourage the user to continue using our approach and to make him choose tasks that provide better results in his health. The example of a "quest" may be that when the user reaches an amount of points for the game of the attribute "Stress Reduction" he gets a "Zen" medal.

Some quests can reward the player with items or some kind of currency to be used within the game to purchase items. The items are present in RPG games and have several utilities, from helping in completing other quests to items that are merely ornaments to be used by the characters. The latter is desirable to be included in the approach presented here, as besides providing a reward to the player, acting as another persuasive element, allows the user to modify and customize his character, including the character customization. This feature has been cited as a strong persuasive element by Fogg in [19].

The impression that this will cause in the user is that he will be playing an RPG in real life, choosing activities to complete his goals. This is the first desired feature, since in our study we identified only applications that used the development cycle of

<table>
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<tr>
<th>Characteristic</th>
<th>Description</th>
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<tr>
<td>1. Real activities</td>
<td>By making activities within the game to be the same as those performed by the player in the real life, we aim that the evolution of the character will reflect the evolution of the player. In other words, the character will be representing the player himself, and not another being, making the player identify himself with the character he portray.</td>
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<tr>
<td>2. Do not focus on a single type of activity</td>
<td>Allow the game to contain various types of activities, unlike other games that focus only on physical activity, or nutrition. We hope that this diversity of task types will motivate the player to commit once he can add to the tool all activities of his day, allowing his performance feedback to be more efficient, stimulating him to continue playing and helping more widely in his health.</td>
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</table>
| 3. Sharing tasks with reward | Users can share action plans with other users. So when another user wishes to perform a similar task, you may receive an indication of how it was run previously. To keep users always motivated to share their tasks, we apply persuasive elements, described later, and found in RPG-style games.

**Table 1: Features of the proposed approach**
characters in RPG games where the proposed game was a fantasy world and the character did not necessarily represent the player [7].

Therefore, the attributes will be increased only according to the tasks that the player is completing, making the evolution of attributes in the game reflect the evolution that can be observed by the user in real life. For instance, if the player realizes that, analyzing his performance, he needs to give attention to his physical attributes, because they are poorly developed, the user should think about tasks that will develop these attributes.

During the moment of choosing which tasks will be included in his daily agenda, the user may search the on-line base of tasks for any task plan that has been provided by other users. At any time he can also share his own plans to the on-line base. The number of times a plan on the base is included by another user is counted as another attribute of the player, the “Helping Hand”, stimulating users to share there plans with others.

Finally, our approach includes the use of rankings with the scores of the best players as a tool of mass persuasion. These rankings are broken down by attribute (physical activity, intellectual activity, stress management, socialization, “sleep” and all attributes together) and by time (today, yesterday, last week, last month, ever). This type of division is intended to stimulate new players, because even though there are players with scores far above them, they can enter the top ranking by the criterion of division by time (e.g., may be one of the players who won more points of physical activity last week). Many role-playing games use ranking in order to reward the players that are making more effort to get higher levels, and also to let other players see those players as an example. Maybe this ranking system will generate competition between some players, but we expect that, as we see on RPG’s like World of Warcraft and Lineage, this stimulates the users to act more collaboratively, sharing tasks and counting on one another in other to get better results.

An example of usage of the tool would be as follows. Imagine that Bob notices he has many tasks to be done, but he knows that if he has not help, will probably forget some. Added to this, he also knows that he must take some time for activities that are beneficial to his health during his day, like walking. Bob discovers our tool and starts to insert the activities he should do. At this time he also evaluates the beneficial attributes that each activity can provide to health and associates them. So the walk will give him 1 point (of fitness), while fixing the spout of his kitchen will not give him any points. This gives him a sense of calm, by knowing that their tasks are under control, reducing his anxiety and other effects of social jet-lag. During the day, he is remembered by the tool about which tasks he has to perform and, when he does one of them, he checks that activity as done. At the end of the day, he sees a dashboard with his performance. He notices that he has earned points in fitness, but did not win any reduction in stress. So he searches in the on-line base of tasks and searches for tasks with the string “reduce stress”. Finding some, he chooses one and puts on his schedule for the next day, hoping to improve this attribute. Taking advantage of the fact that he is online, he decides to see in which position he is in the rankings. He sees that he is at 12108º in the overall ranking, but in the ‘daily’ ranking, he is at 26º. This gives encouragement to continue using the tool to control his activities, trying to strive to improve some more and climb the rankings.

V. CHALLENGES

Some of the identified challenges that we will face for our study to be successful are:

1. **Stimulate the user**: Keep the user entertained and stimulated to continue using the tool in the long term. Using the persuasive mechanisms presented in this work, we expect the user to continue using the tool for a long time, unlike other tools that are used for a short period of time and, as they can not hold the user’s attention, then they are no longer used.

2. **Provide security**: Providing security for the user’s information, so that he can include any activity in their tool without fear that someone else can view his data. This will be achieved by making no association - on the server - between the activities and their owners. This association will be made only at the user application and any information that can be sent to the server will be asked for the user to confirm it first.

3. **Measure effectiveness**: Measuring improvement in the health of the user. Integrating in the tool itself implicit or explicit means of measuring how much the user is benefiting from the use of the tool.

4. **Provide a simple interface**: Provide an easy to use interface. So you can quickly add a new task, even having to fill the attributes related to this. This is important because if the user has to spend much time to add a task on their schedule, this will discourage its use.

VI. RESEARCH MODEL

In this session we present each step of the model that is being used to develop, test and validate the approach presented here. We are leveraging the eight steps indicated by Fogg for creating persuasive technologies [23], as show in Table 2:

<table>
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<tr>
<th>Step</th>
<th>How-to</th>
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<tbody>
<tr>
<td>1. Choose a simple behavior to attack</td>
<td>We begin by applying our approach to a small set of activities. We chose to start monitoring physical activity and sleep, because we found more success stories related to these behaviors.</td>
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<tr>
<td>2. Choosing a receptive audience</td>
<td>We will choose people who, despite wanting to improve their health through physical activity and better control of their daily tasks, yet failed to make these activities a diary.</td>
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TABLE 2: LEVERAGING FOGG’S EIGHT STEPS TO CREATING PERSUASIVE TECHNOLOGIES

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<thead>
<tr>
<th>Step</th>
<th>Description</th>
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<tr>
<td>3.</td>
<td>Discover which prevents the chosen behavior</td>
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<td></td>
<td>We believe that the main reasons are the lack of motivation, lack of feedback on the performance of activities and lack of control of day-to-day as a whole.</td>
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<tr>
<td>4.</td>
<td>Choose a familiar technology channel</td>
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<td></td>
<td>We chose an application for smartphone, as it will allow the users to always be aware of the tasks that are registered, and they can check their performance at any time.</td>
</tr>
<tr>
<td>5.</td>
<td>Find relevant examples of persuasive technologies</td>
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<tr>
<td></td>
<td>We have analyzed several examples of previous approaches, such as those cited in this paper.</td>
</tr>
<tr>
<td>6.</td>
<td>Imitating successful examples</td>
</tr>
<tr>
<td></td>
<td>As shown in the section of related work, by analyzing other approaches, we have identified their strengths and kept in our approach.</td>
</tr>
</tbody>
</table>

Steps 7 (Test and iterate quickly) and 8 (Expanding on success) have not been implemented and will be planned as soon as we get results from the use of the application. Moreover we emphasize that we will get usage and effectiveness feedback of the tool through electronic questionnaires that will be sent to the users. In the future we intend to use the usage data that users enter in the application to help measuring its effectiveness.

VI. CONCLUSION AND FUTURE WORK

In line with the problem discussed here - the need of creating a task scheduler that can assist the user in choosing, scheduling and performing daily tasks - we believe that the solution of using persuasion mechanisms is needed to assist the users in managing and performing their daily tasks, while trying to make them choose tasks that will provide more benefits to their health. With this application we intend to achieve the following objectives: users can better manage the tasks they intend to execute; users can organize their tasks in order to develop the attributes they consider most important; users will have feedback on their performance both in observing the performance of their own characters, and also comparing it to other players by checking the ranks.

REFERENCES