Human-Computer Interaction (CS 6352)
Final Project Report

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ABSTRACT
We were interested in improving an existing commercial system, "Teamfind" in terms of human-computer interaction, by reducing unnecessary inputs from the user. Namely, we eliminated account registration and search options. We hoped to show that the new system could be used more quickly with comparable reported usefulness, but actually found that some aspects were slower, and the system was reported as less useful overall. We believe these are due to implementation issues rather than a flawed goal, but due to the number of conditional differences cannot say much definitively.

1. INTRODUCTION
1.1 Motivation and Previous Work
Many online games involve forming groups of players into "teams" or "clans" that work cooperatively for an extended period of time. There are many factors that determine how well a group of players performs other than individual performance. Perhaps the most general consideration is one of timing – that is, players in such a group should generally all be playing the game at the same time. This is somewhat analogous to meeting scheduling, which can be difficult for humans without assistance, and is studied in its own right [Jacques]. Team play can be thought of as a recurring meeting in which attendance is not mandatory. In this study, we developed and tested a system for grouping players of the game "League of Legends" into teams, and compared it with an existing commercial system. We focused on mining publicly available data about players to minimize the amount of data that must be input by players.

2. SYSTEM DESCRIPTION
The most important requirements for such systems are as follows. Players should be able to quickly make informed decisions regarding which team to join or regarding who to accept as new team members. Once both a team and a player have indicated willingness for the player to join the team, it should be easy for them to continue communication and/or officially have the player join the team in the actual game "League of Legends".

2.1 "Teamfind" System
This is the commercial system, which was used as a point of reference when designing the system under study. It matches players together in the games "League of Legends" and "World or Warcraft". Each user must make an account before creating or applying to a team. A large amount of data can be input by the user, and very little is data is automatically populated using the public API for the game "League of Legends". When searching for a team, the user is able to sort search results by number of members or amount of time since the team information was updated.

2.2 "Dream Team" System
This is the system designed for the study. It focused on requiring the bare minimum of input from the user, especially when searching for a team. It relied heavily on the public API for "League of Legends" when providing information about players or teams. When searching for a team, results were automatically sorted such that top results were near the searcher's skill level and have historically played at the same times as the searcher. Thus, searches were personalized without the user having to input explicit search parameters aside from their "League of Legends" username.

Another major feature of this system is that, on several pages, it provided visualizations of what days of the week teams or players have played "League of Legends" historically.

3. METHODS
3.1 Participants
There were a total of 4 participants. All participants were self-describing League of Legends players. All four were male, right-handed, and aged 18-22. The first participant served as a pilot study of sorts; the other 3 participated in the study proper.

3.2 Experimental Design
The study was a within-subjects design. All participants used both the commercial "TeamFind" system and the "Dream Team" system designed by the researchers. In condition A, the "Dream Team" system was used first to complete all tasks, then the tasks were completed again using "TeamFind". In condition B, "TeamFind" was similarly used first, then "DreamTeam". It is worth noting that, because we had an odd number of participants, 2 were in condition B, while only 1 was in condition A.

The dependent variables were the amounts of time required to complete each task, and the perceived usefulness of the systems as measured by surveys immediately after. The independent variables were condition (which system they used first), age, gender, amount of time spent playing the game "League of Legends", and skill level in the game "League of Legends". However, because it so happened that all participants were males in the same age group (18-22), we can consider only the independent variables of condition, the amount of time spent playing League of Legends (in self-reported hours) and skill level at League of Legends (in self-reported "league" ranking).

The tasks completed on both systems by each participant are as follows:

1) Find a Team: participant asked to imagine that they are looking for a new team to join, and asked to attempt to find a suitable team and join it in the system.

2) Register a Team: participant asked to imagine that they have a team but have not registered with the system, and asked to do so.

3) Review Applicants: participant is logged in as a different team (by the researcher), and is asked to check for and review any and all applications to the team.

Data was captured using screen capture of the device in use, notes from the researcher, and surveys. Screenshots of both systems as they are used to complete the tasks are in the Appendix.

3.3 Apparatus

When testing began, the researcher provided a computer which was already recording its screen, with a web browser window open and each of the relevant surveys and systems "bookmarked" in the web browser.

There was no training before using either system. There was only one trial of each task on each system, because the tasks involved an element of decision making which would be eliminated in later trials; i.e. when asked to complete the "Find a Team" task a second time, the participant would likely simply select their previous choice.

Each participant did as follows:

0) Hear introduction to study and sign consent form

1) Complete demographic survey

2) Complete tasks 1-3 on the first system

3) Review the first system with a survey

4) Complete tasks 1-3 on the second system

5) Review the second system with a survey

6) Review both systems with a comparative survey

4. RESULTS

Perhaps the most objective measure of task performance is how long it takes to complete comparable tasks in the two systems. However, this is not the only useful measure, because a trivial system which provides no benefit to the user could be used very quickly. For this reason, we also look at questionnaire responses.

4.1 Time on Task

In Table 1, mean time to complete each task is shown, along with standard deviation, with standard deviation inside parentheses. P values of two-tailed student t-tests are also shown, where the null hypothesis for each task is that the systems were equally effective in terms of completion time. Quotation marks are used to indicate that a cell, or a portion of a cell, is the same as the cell to its left.

	Find a Team	Register Team	Applications	Total time
Dream Team	113.33 (84.04)	278.00 (45.90)	67.00 (53.25)	458.33 (137.45)
Teamfind	403.50 (89.74)	94.00 (62.35)	62.75 (48.11)	560.25 (158.99)
conclusions	t_D < t_T**	t_T < t_D**	none	none
p	0.0074	0.0079	0.92	0.43

Table 1: Task times (in seconds)

We see in Table 1 that, despite our tiny number of participants, we were able to find some significant results. Namely, we found that it was faster to find a team using our "Dream Team" system than it was to use the commercial "Teanfind" system, but "Dream Team" was slower when the user registered a team. We also see somewhat suggestive results that our "Dream Team" system was faster to use overall (about 100 seconds or 20% faster on average).

We expected the "Dream Team" system to be faster to use overall because, during the design of the system, we tried to minimize required user inputs. It is no surprise that finding a team in particular is faster, since the number of required fields before applying to a team was reduced from 5 to 1 (Teamfind requires that an account first be created, with a username distinct from the "League of Legends" username). It is worth noting that the time spent registering an account on "Teamfind" was only added to the "Find a Team" task because it was always the first task, although *account* registration was also required for *team* registration.

The large amount of time spent registering a team is believed to be due to a bug in the final version of the "Dream Team" system; this bug removed the alert which notified users of successful registration. As a result, users often attempted to register multiple times even when the first registration was successful. The "Dream Team" system also required for a user to log in after registering, instead of logging in automatically upon registration.

4.2 Questionnaire Responses

Immediately after using each system, each subject answered 6 which used a Likert scale of 1-7. These responses are analyzed in Tables 2 and 3. After using both systems, subjects answered 6 more questions with Likert scales of 1-7 (3 for each system), along with 4 short answer questions. These Likert scale responses are analyzed in Tables 4 and 5. Note that lower values are better except in Table 5, where higher values are better; the labels given to the extemes of each scale are given in each table.

In the Tables 2-5, mean responses are shown, along with standard deviation, with standard deviation inside parentheses. P values of two-tailed student t-tests are also shown, where the null hypothesis for each question is that the systems elicited the same response. Quotation marks are used to indicate that a cell, or a portion of a cell, is the same as the cell to its left.

It should be noted that student t-tests assume that responses are ordinal (which we argue that they are, since only the extremes were labelled) and assumes that responses are continuous (although really they were forced to be discrete, one of 7 values). We believe that student t-tests are adequate in our case, since no p values using this approximation were near significance, so they would be unlikely to be significant with more advanced, discrete analysis.

Question	How easy was it to find a team?	"" register a team?	"" review applications to a team?
Description of Extremes	1: Barely had to think, 7: Extremely confusing	""	""
Dream Team	3.00 (2.00)	4.67 (2.52)	2.67 (1.15)
Teamfind	2.67 (1.53)	2.33 (0.58)	3.33 (2.08)
p	0.42	0.25	0.53

Table 2: Ease of Task Completion

Question	How long did it take to find a team?	"" register a team?	"" review applications to a team?
Description of Extremes	1: Very little time, 7: Way too long	""	""
Dream Team	3.00 (1.73)	4.67 (2.08)	1.67 (0.58)
Teamfind	2.33 (0.58)	3.00 (0.00)	3.67 (1.53)
p	0.42	0.30	0.18

Table 3: Subjective Task Durations

The systems were not significantly different in terms of ease of task completion or perceived time required to complete each task. However, this is unsurprising due to our extremely low sample size. In terms of means, our system was reported as worse except with respect to application review.

Reported subjective duration seems to be correlated with reported ease, for each task. In fact, subjective task duration seems to be more strongly correlated with reported task ease than it is with actual task duration! This may be because users do not perceive account registration as part of the process of finding a team, even though it is a required step. Recall that account registration is required in "Teamfind" but not in "Dream Team".

Question	Ease of use of the <first/second> website
Description of Extremes	1: Barely had to think, 7: Extremely confusing
Dream Team	3.33 (2.31)
Teamfind	3.00 (1.73)
p	0.88

Table 4: Overall Ease of Use

Consistent with the means analysis of Table 2, we see that our system was perceived as worse in terms of ease of use. This result is also not significant.

Question	If you were really looking for a team, would the <first/second> website be worth using?	"" looking for team members ""
Description of Extremes	1: Complete waste of time, 7: Best way to find a team	""
Dream Team	3.67 (2.08)	3.67 (2.08)
Teamfind	5.33 (0.58)	5.33 (0.58)
p	0.20	0.37

Table 5: Overall Usefulness

Note that higher values are *better* here, unlike on all previous questions. This may be confusing, both to reader and to the subjects, and should be avoided in future. Reported usefulness of our "Dream Team" system was lower on average than that of the commercial "Teamfind" system. Once again, these results are not significant.

5. DISCUSSION

Due to our very small sample size of 3 subjects, we found very few statistically significant results. The significant results are that it took longer to register on our "Dream Team" system than on the commercial "Teamfind", but took less time to find a team. The faster team search is believed to be because "Dream Team" does not require account registration in order to apply to a team. The slower registration is believed to be primarily due to a bug which resulted in no confirmation of successful registration.

Because of our small sample size, we can't make many definitive claims about our system, let alone interfaces in general. However, if the reader will humor us, we will make some general claims inspired by this study nonetheless (many of which have been studied elsewhere).

Users are surprisingly trusting of opaque search functionality. Our "Dream Team" system sorted teams by distance to searcher skill level and by overlap in which days they play, but none of this was revealed to the users. Perhaps due to the prevalence of search engines such as Google, users largely clicked on top matches without questioning how matches were selected or sorted.

Confirmation of success after completing a form, e.g. our registration form, is expected by many users; a lack of confirmation may be interpreted as failure, and cause confusion and unnecessary repeated attempts.

We created a completely separate system from the large commercial system Teamfind for the purposes of comparison. However, although we feel we were able to optimize some processes, because of the size of the Teamfind system we were unable to provide all of its features. This resulted in lower reported usefulness. It seems very much preferable to have access to the source code of a system being studied, and make minor modifications in order to isolate the effects of differences.

Elimination of account registration, when possible, can save time and reduce confusion. Because all users already had an account for the game "League of Legends", it was possible to uniquely identify them while acquiring information about them, without a separate in-system identity. Some users of Teamfind expressed confusion as to which usernames were Teamfind usernames and which usernames were the underlying "League of Legends" usernames.

6. CONCLUSIONS

With very different systems across conditions, and a very small sample size, the things we can conclude are very obvious. The less a user has to input (e.g. removing account registration), the faster they can complete a task. Lack of confirmation of success can lead to an assumption of failure, resulting in the user wasting time retrying.

7. REFERENCES

[1] Wainer, Jacques, Paulo Roberto Ferreira, and Everton Rufino Constantino. "Scheduling meetings through multi-agent negotiations." Decision Support Systems 44.1 (2007): 285-297.

8. APPENDIX

8.1 Dream Team

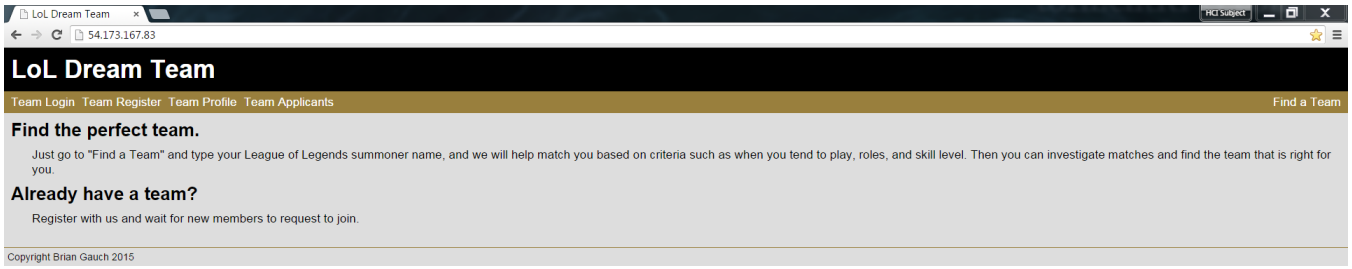

Figure A1: “Dream Team” Home Page

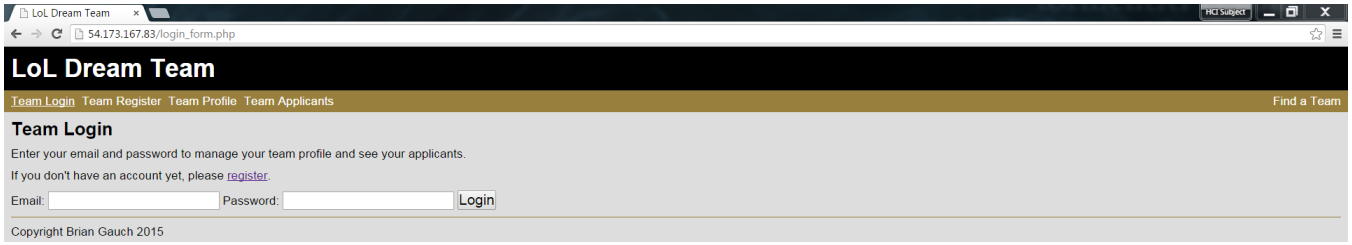

Figure A2: “Team Login” Page

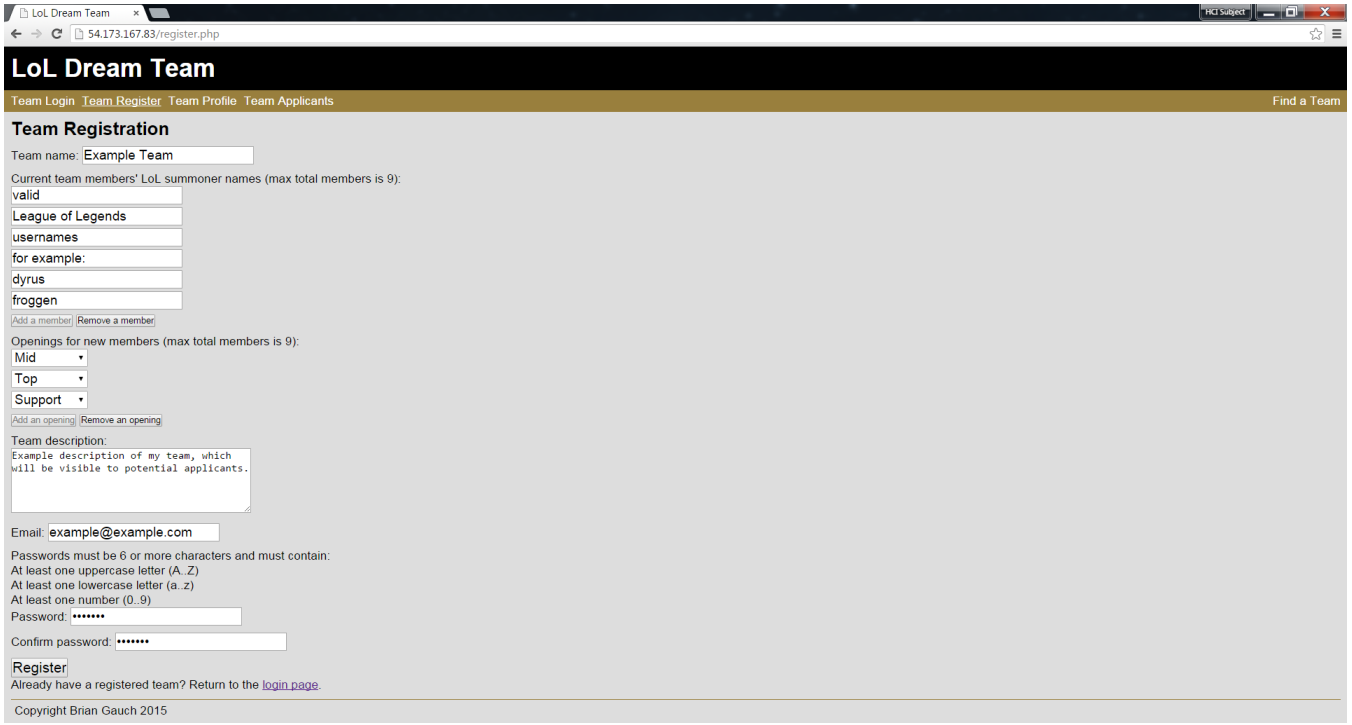

Figure A3: “Team Register” Page

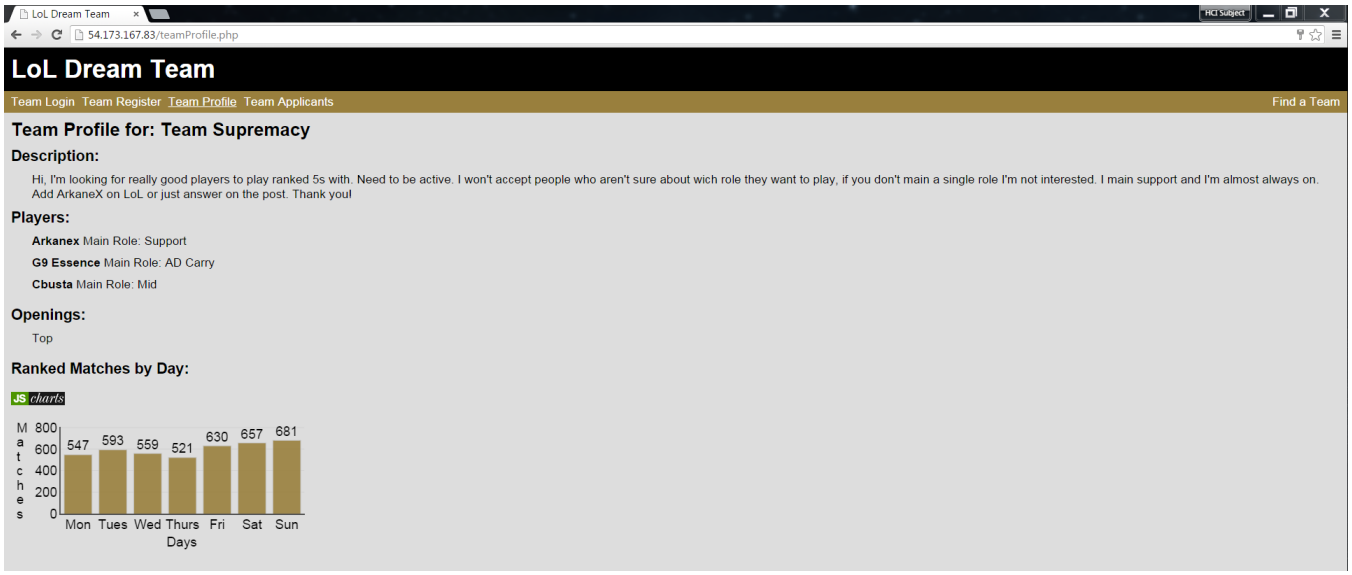

Figure A4: "Team Profile" Page

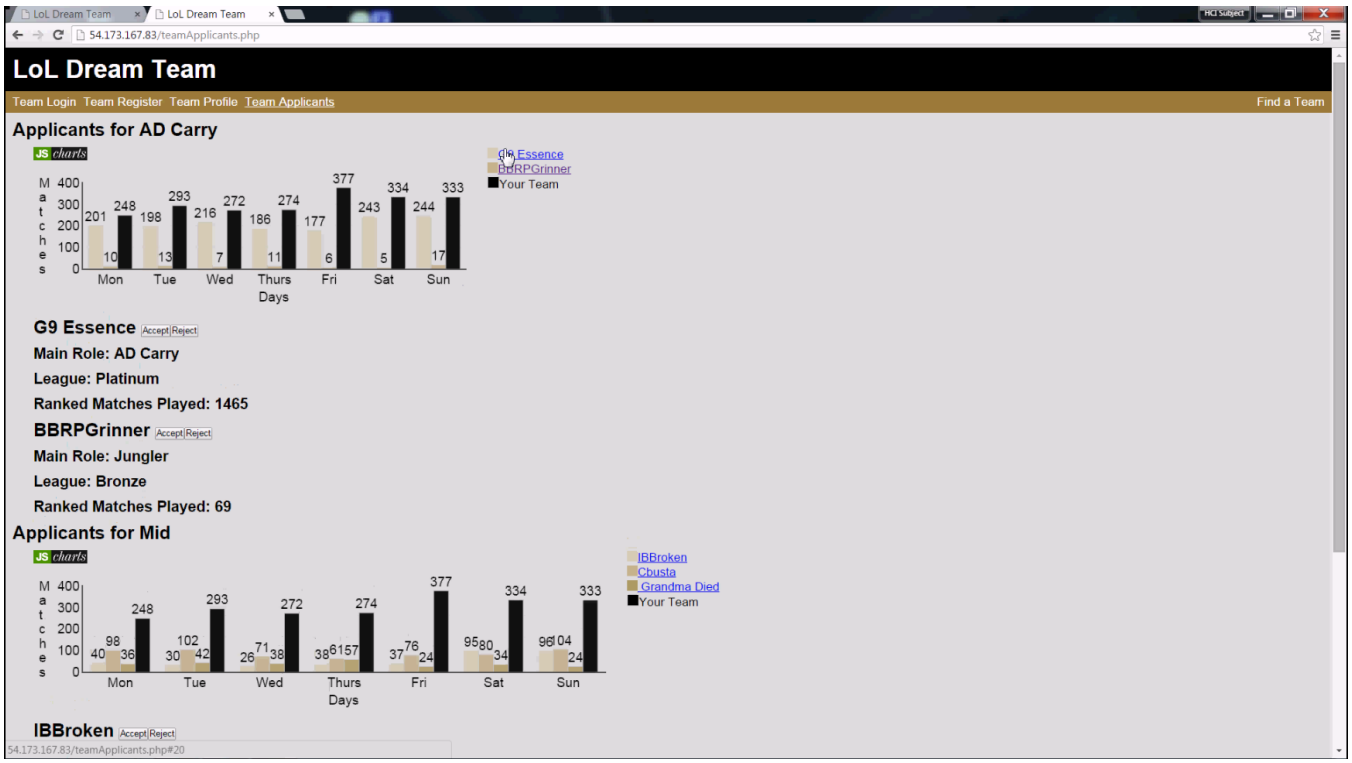

Figure A5: "Team Applicants" Page

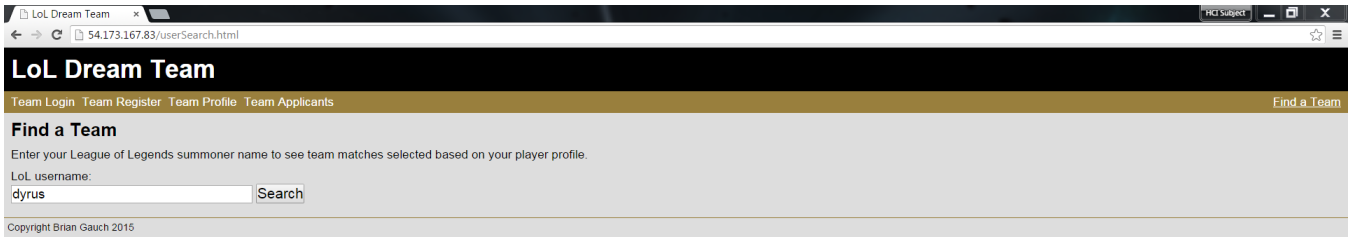

Figure A6: "Find a Team" Page

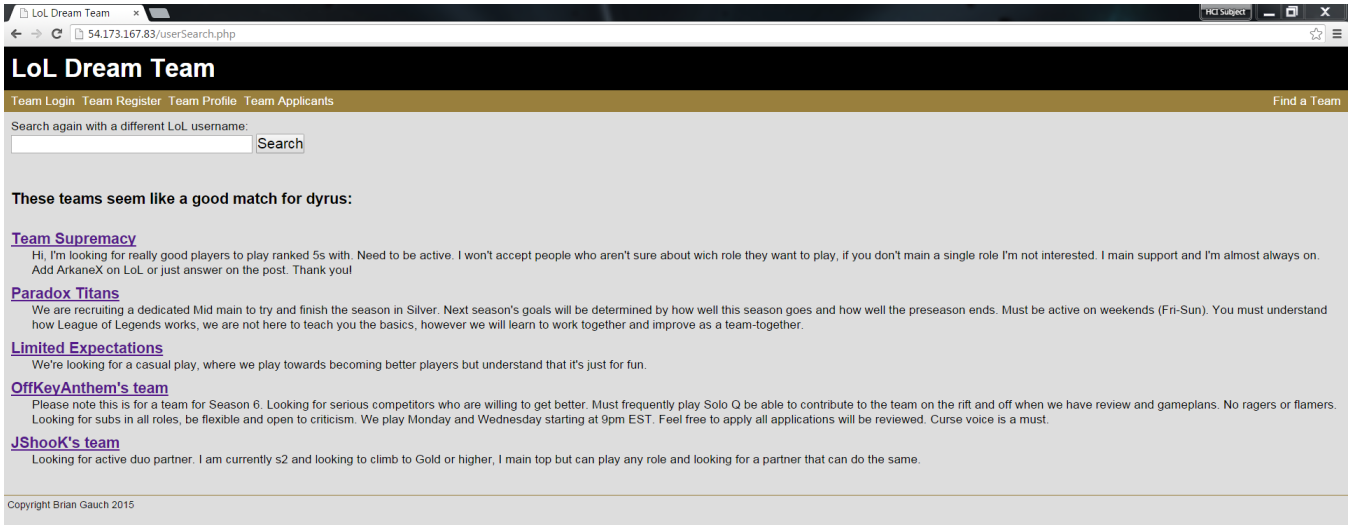

Figure A7: “Find a Team” Search Results

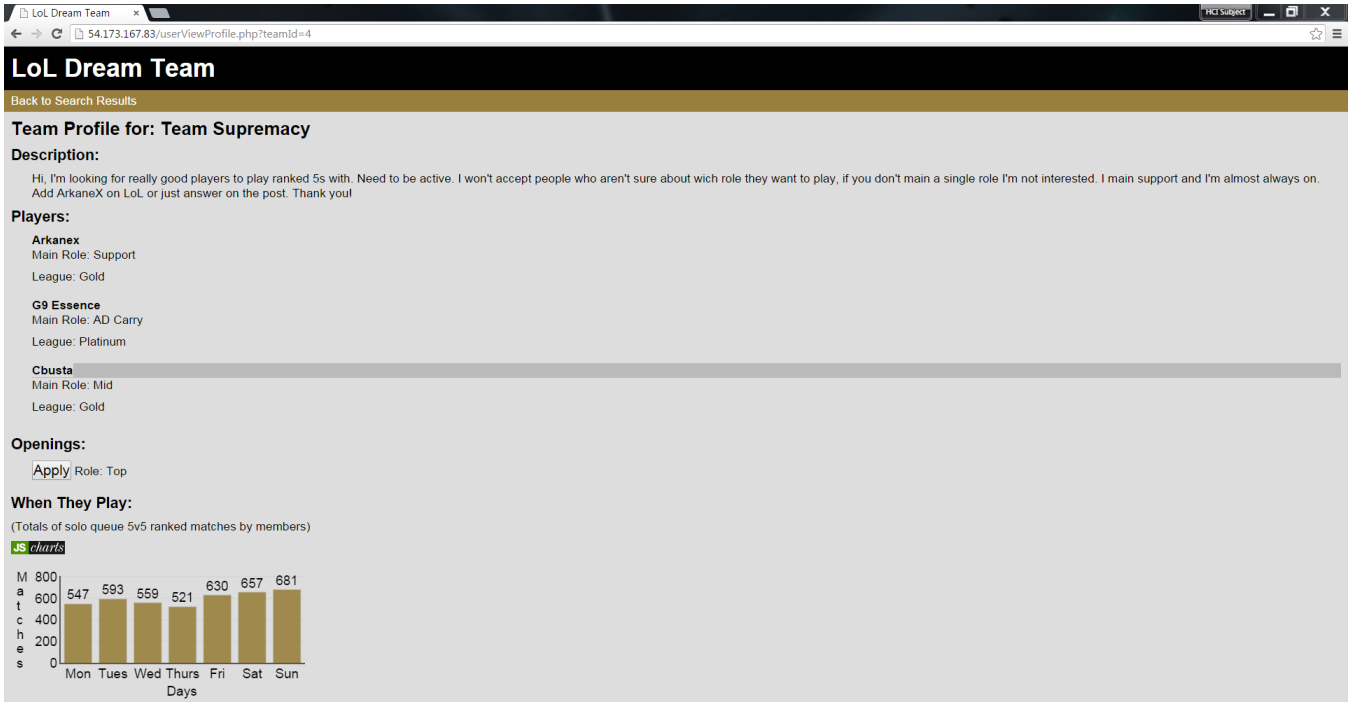

Figure A8: Detailed “Find a Team” Search Result

8.2 Teamfind

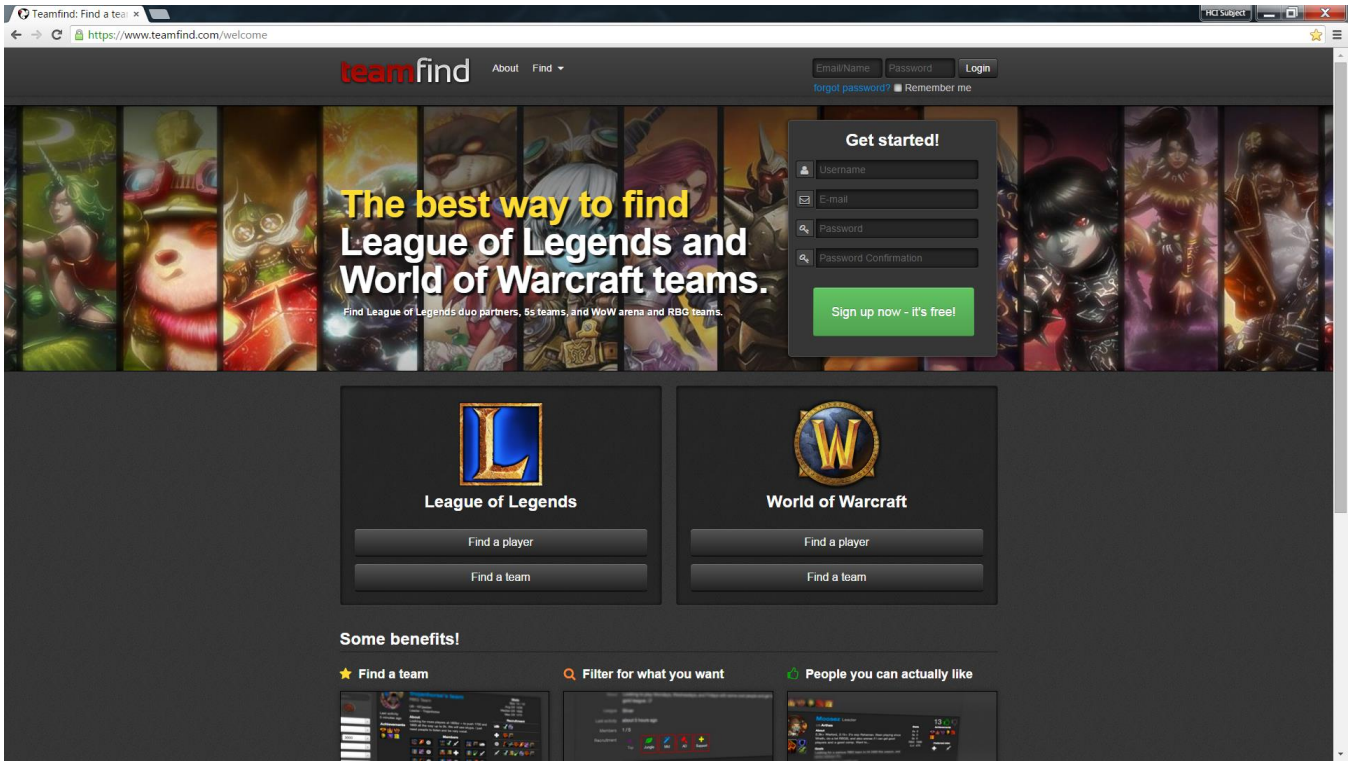

Figure A9: "Teamfind" Home Page

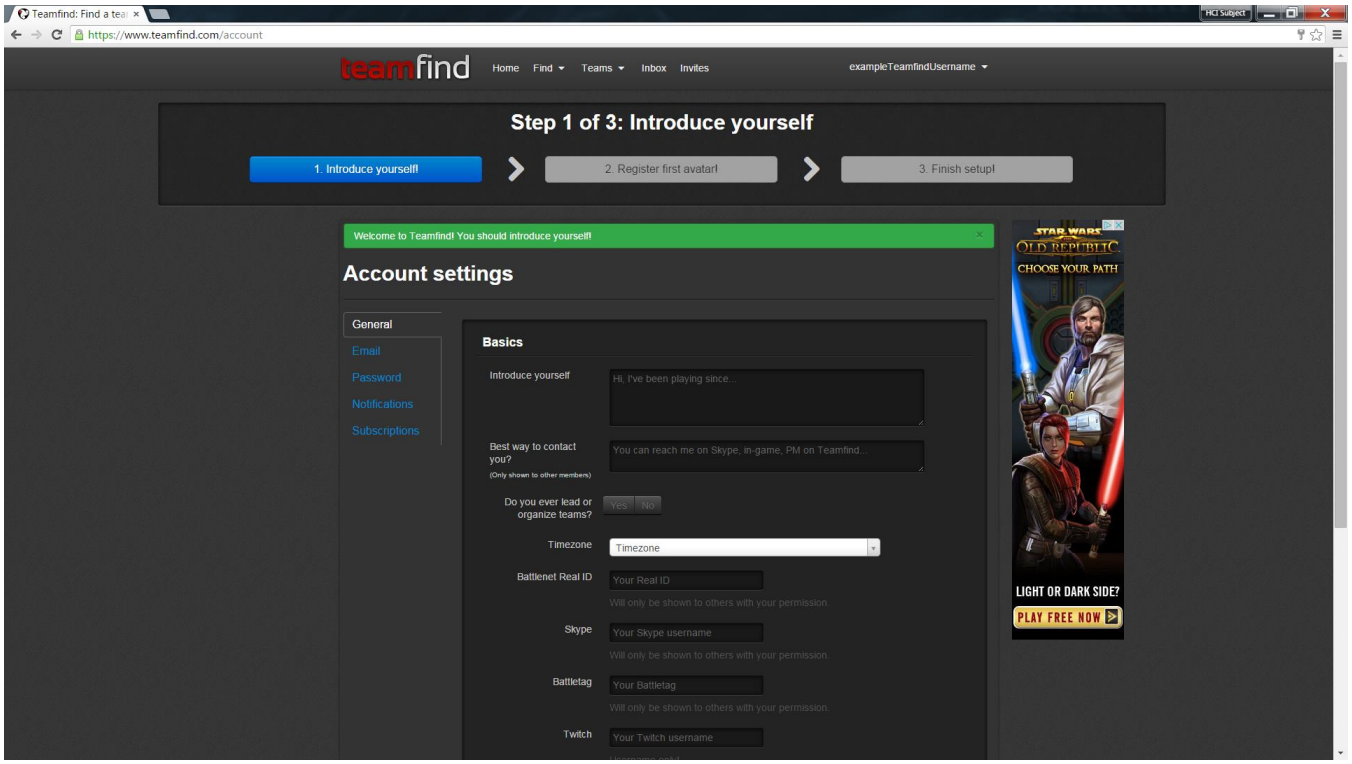

Figure A10: Account Registration Part 1

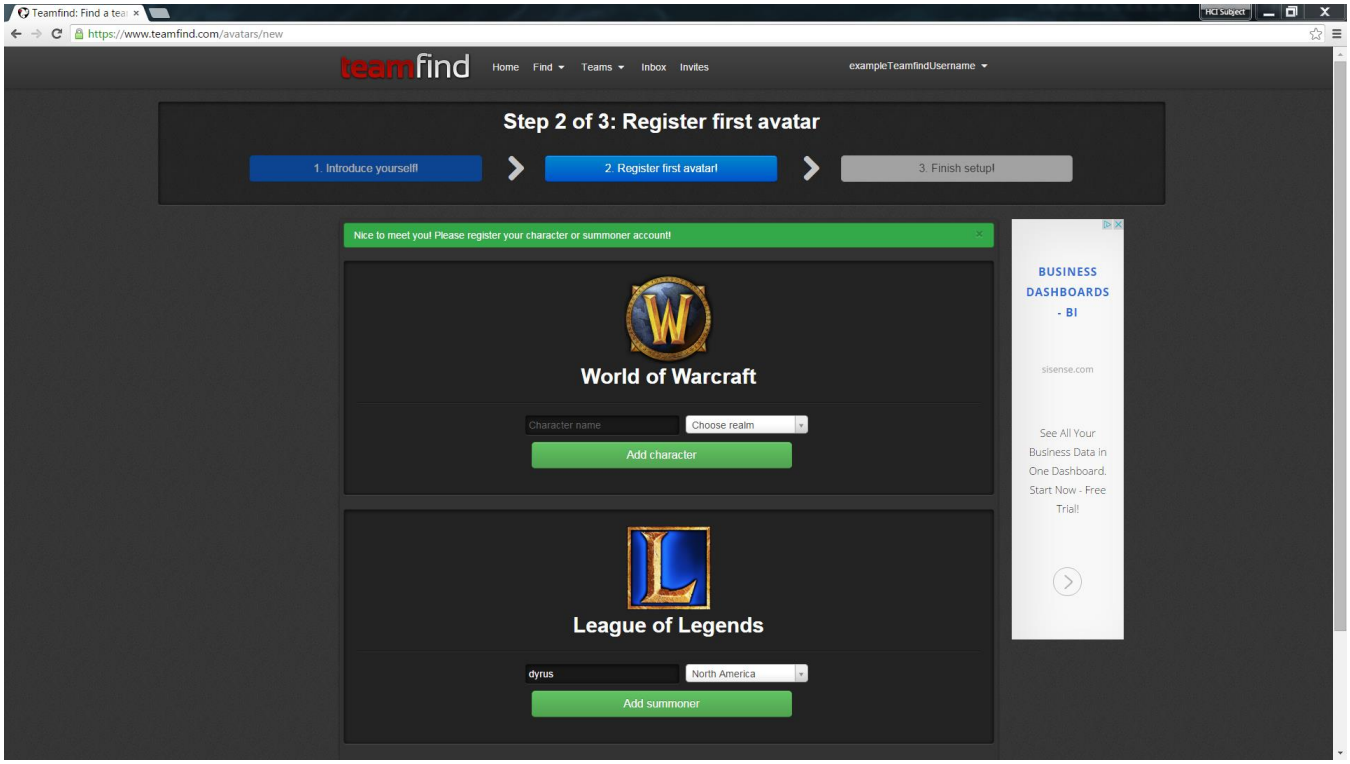

Figure A11: Account Registration Part 2

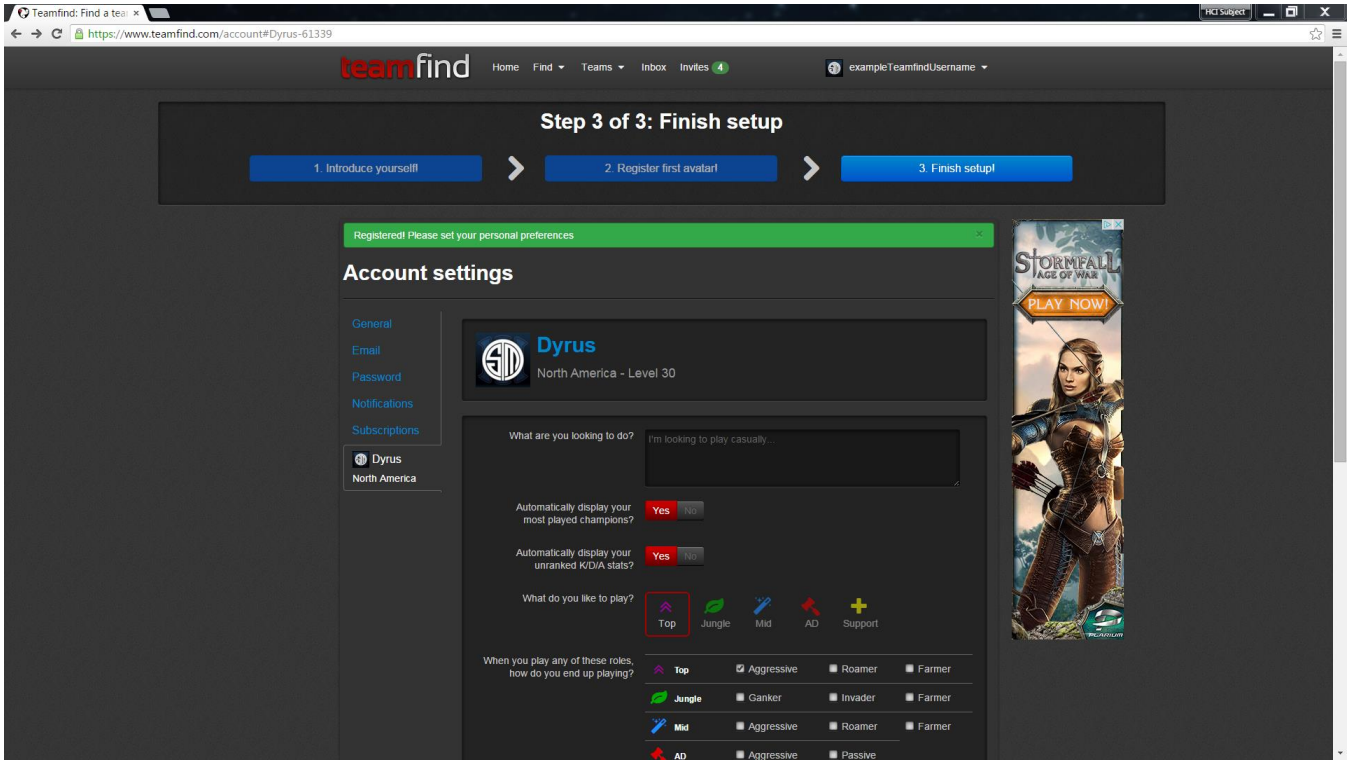

Figure A12: Account Registration Part 3

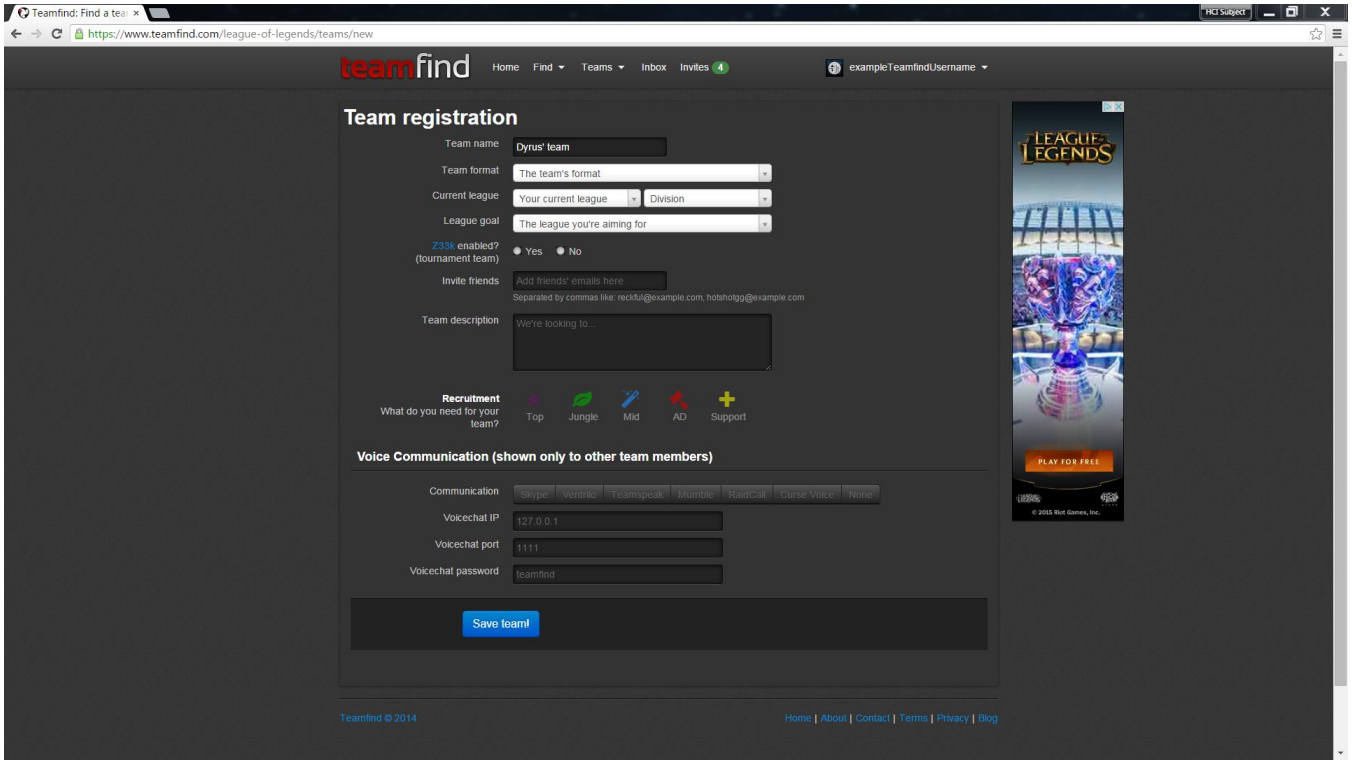

Figure A13: Team Registration

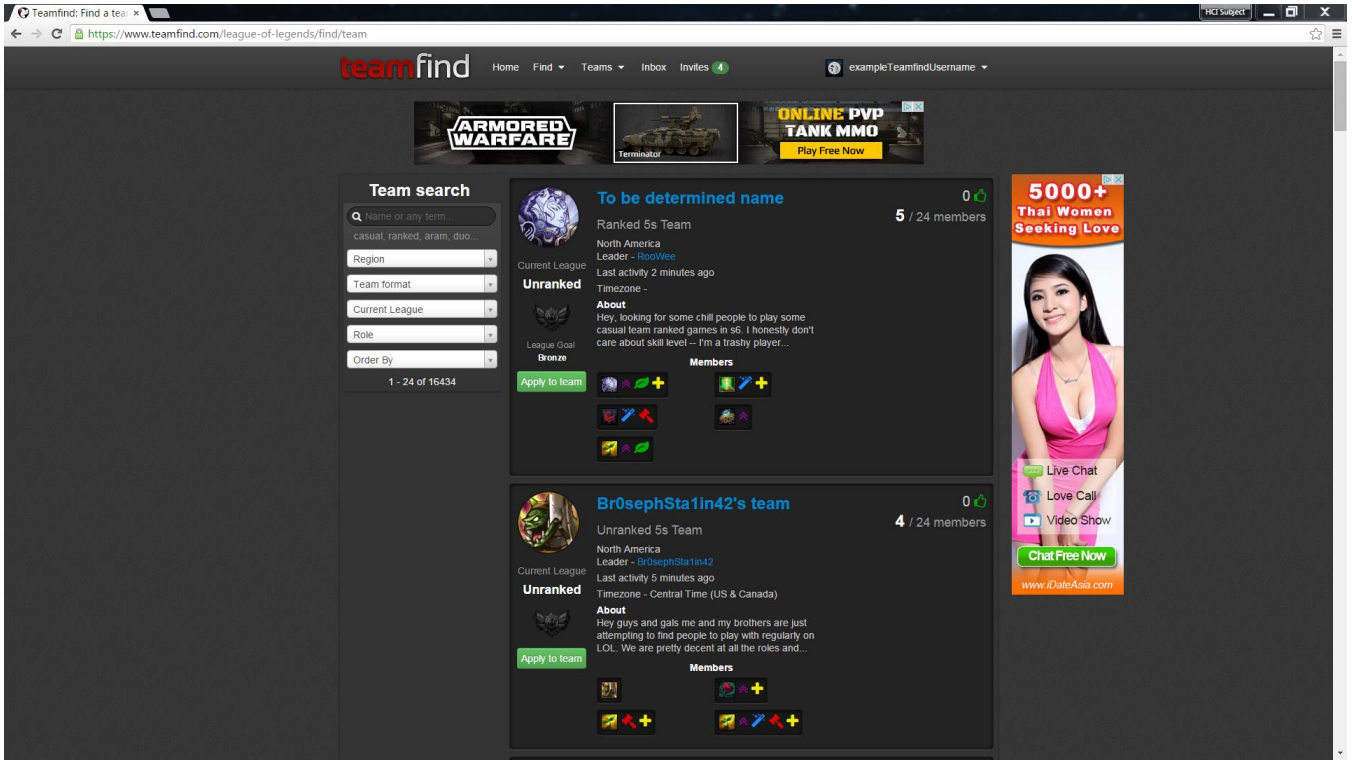

Figure A14: Team Search

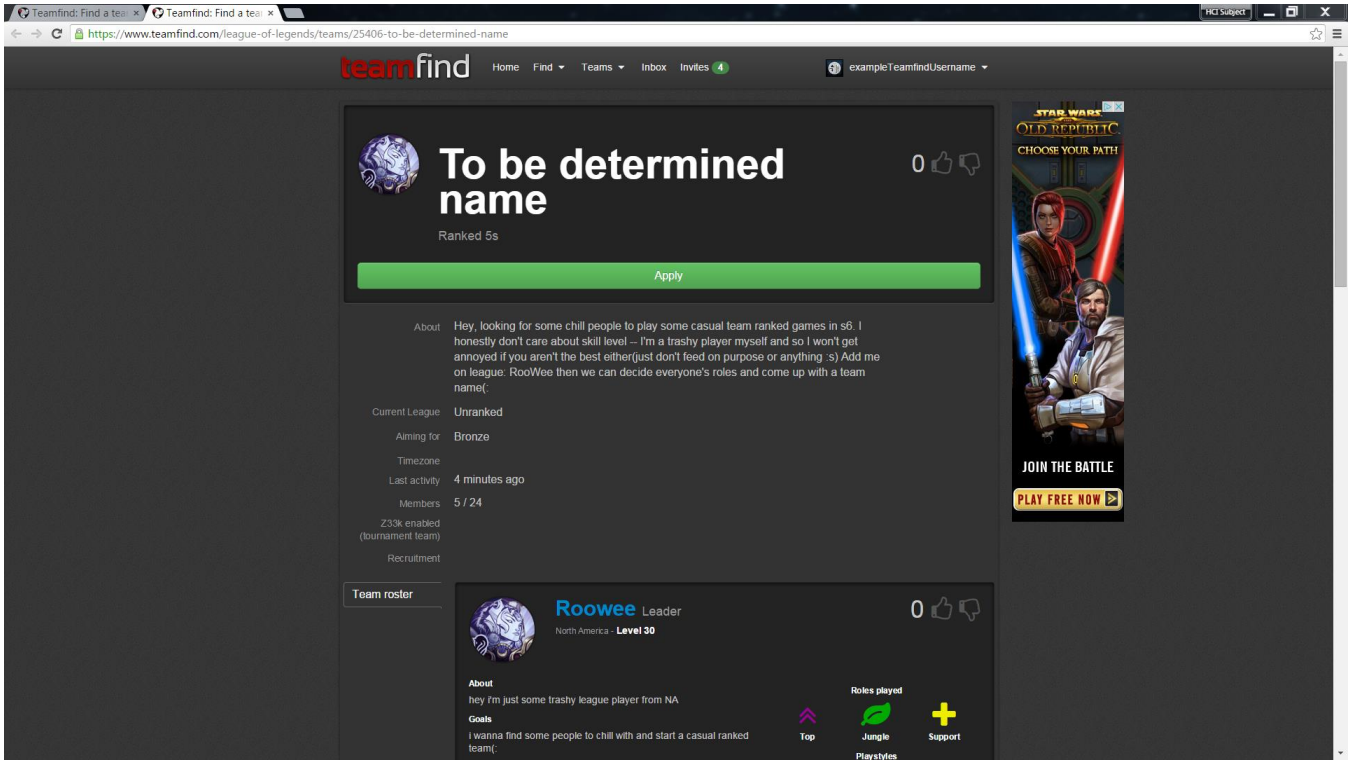

Figure A15: Detailed Search Result

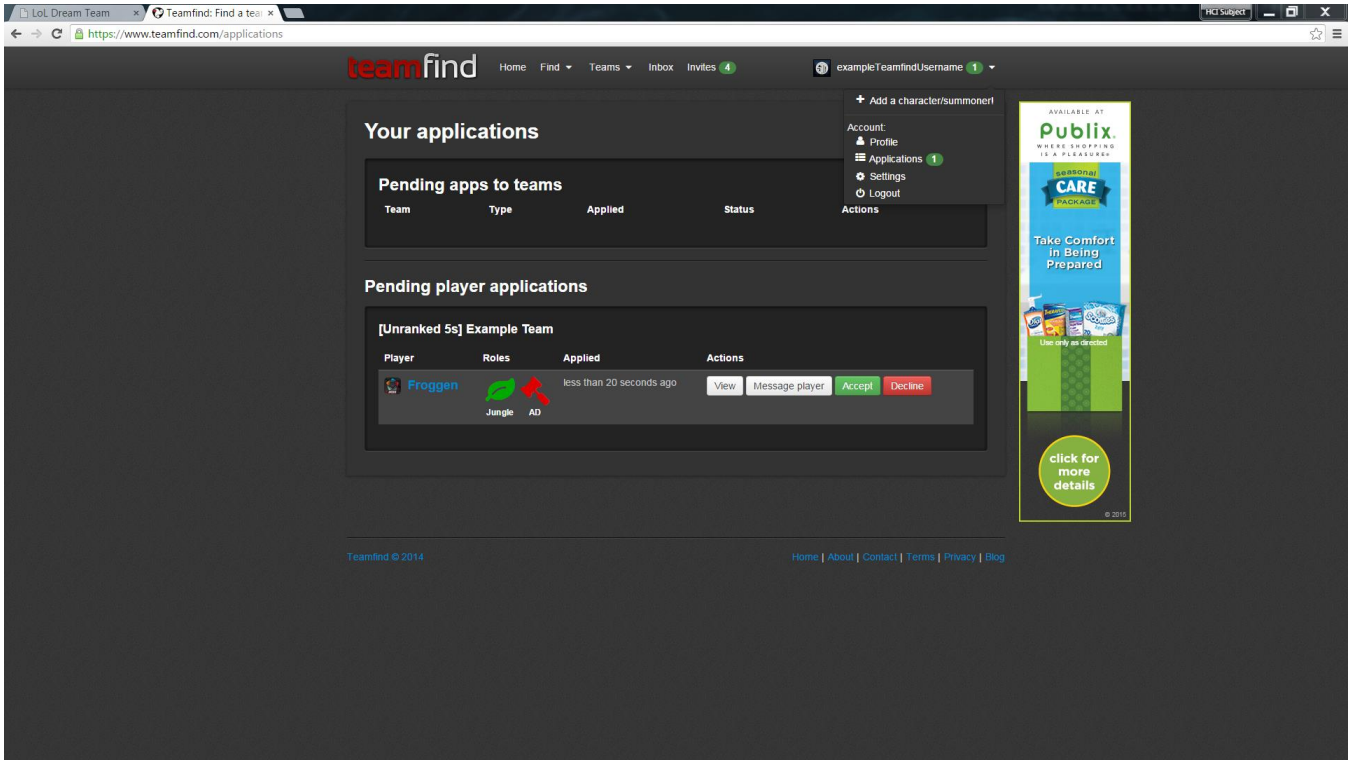

Figure A16: Application Notification

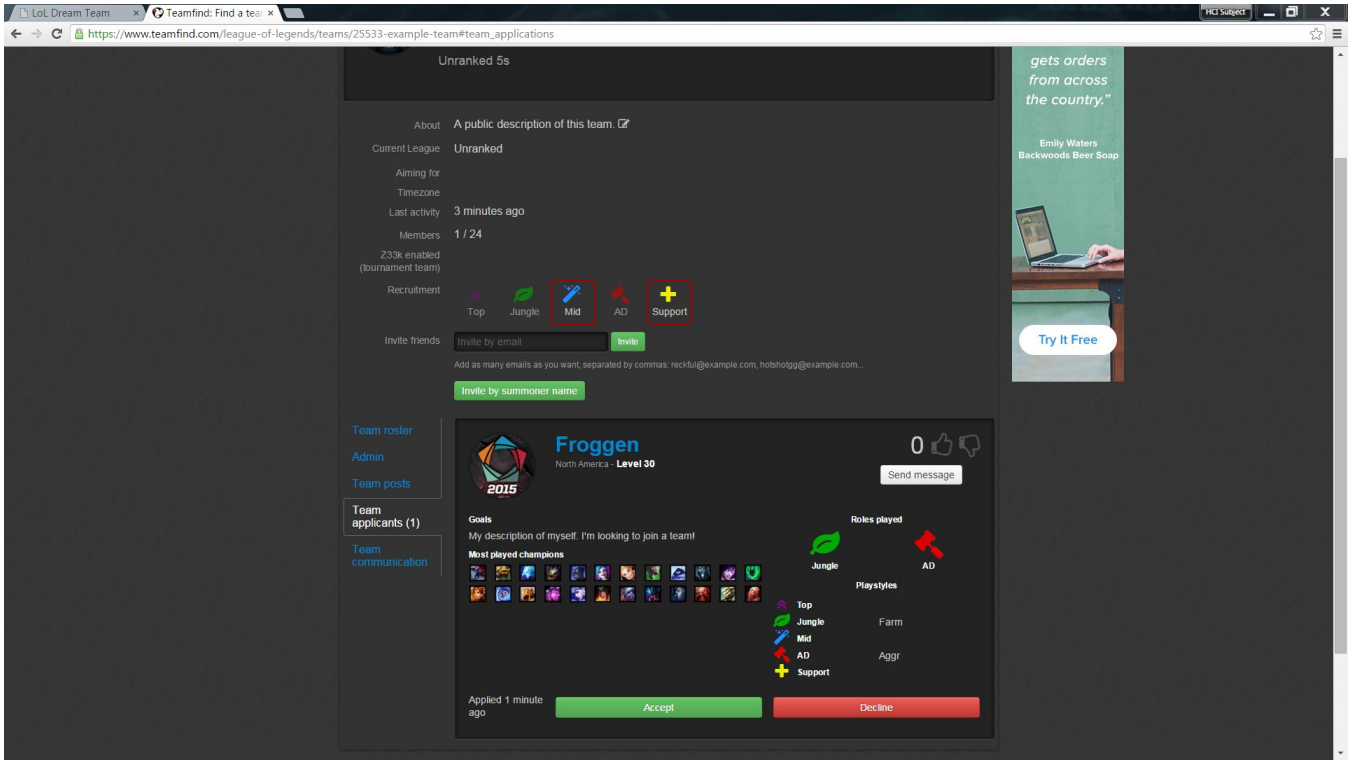

Figure A17: Application Details