Abstract

The importance given to body image and health in our society is a growing factor. The proof is the exponential growth of the business areas that support them, such as Health Clubs. Despite this, adaptation to new technologies is still slow and reluctant, with paper and pen remaining the main method to record training parameters, leading clients demotivation and making impossible the automatic treatment and analysis of the data.

The main objective of this project is the technological restructuration of the communication between client and Personal Trainer, helping improving their jobs and enhancing their motivation.

The solution architecture is a desktop application that facilitates the elaboration of training and nutritional plans in which the training parameters are stored and analyzed, making possible a better evaluation of the client’s evolution. Recorded parameters include physiological data such as average heart rate during the training, measured with a monitoring watch/cardiofrequencimeter. Data storage during training uses an online application running on a mobile gadget with Internet access in real time.

The interface was one of the major concerns of this application and was therefore a focus point of the development using recursive prototyping with consecutive user tests.

Interviews and tests with specialists in training routines and nutrition were applied as the main methods to evaluate the main functionalities of the project.

**Keywords**: Health Club, Personal Trainer, client, communication, monitoring, evolution.
Introduction

The business industry of Health Clubs is a market with exponential growth in the last years as we can see on the Figure 1.

Data from 2007 says that about 1.5 million people uses some kind of gymnasium in Portugal [Mar09], distributed by 1300 clubs and with annual gross revenue of 310 million euro's [CSC08]. For study purposes we choose three of the most important Health Club brands acting in the Portuguese market today: Holmes Place, Solinca and Active Life.

There are several issues with this Health Clubs that were discussed in an interview with a Fitness Manager [Soa10] that can be resumed as follows:

- **Lack of monitoring during training sessions** – Clients feel unsupported during training by the Health Club employees. The last ones, due to the lack of adequate means to monitor the client’s evolution feel demoralized because only receive monetary incentive with personal training.

- **Lack of nutritional support** – There is almost no nutritional support personalized to each client;

- **Difficulties to monitor evolution** – The available means to register training session’s evolution are pen and paper where the client should take note of his marks during training. Obviously this method makes automatic data processing impossible,

- **Lack of knowledge** – The lack of knowledge of the correct posture of the exercises allied to the lack of monitor leads some times to injuries, both minor and major.

Other major issue is the absence of personalized training plans for each client. Usually to each client is given a standard plan which will only be modified if the client requests a new physical evaluation.

In the Active Life chain, the monitoring of the training is done differently, as we will see in more detail when we describe the Wellness System from Technogym, but even here the problems with specific training plans to each client remains.

The main motivation for this project is to apply the knowledge in technology and human machine interaction and to apply these concepts in this expanding market with the objective of optimizing the processes and the client’s satisfaction. Combine the taste in user centered conception with the human sciences was great motivations for this project.
State of Art

Currently there are several desktop and mobile applications available on the market, for personal and commercial use, which try to solve some of the problems explained earlier. During this work were studied in detail 5 of them and for this article we chose the most complete and innovative.

VidaOne & Fitness 3.0 is an application, available for both desktop and mobile platform which combines functionalities that allow the user to maintain record about his diet and training routines. Its main differentiating feature of its competitors is the possibility of integration with existing software for handled devices such as iPhone and other smartphones. It’s most important features are listed below:

- **Multi User profiles** – Allows each user to create his own profile to save his nutritional and training plans, health records and personal definitions;
- **Journal** – Shows meals, training sessions, number of calories spent, and time spent per exercise;
- **Reports** – Allows visualization about meal reports, trainings and health;
- **Graphs** - All information can be summed in graphs;
- **Nutrient control** – Allows user to maintain record about specific nutrients to ensure that his diet don’t exceed the advisable quantities;
- **HRM Support** – Give the user the possibility to import information from his heart rate monitor, with different brands supported (Polar, AXN, F, CS, RS or A-Series).

The interface of VidaOne is intuitive and very easy to interact. The Figure 2 is an example of the application menus.

After a carefully study of this application we can conclude his main advantages and disadvantages which are listed in the Table 1:

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Excellent user graphical interface with great usability;</td>
<td>• Absence of automatic generation of both nutritional and training plans suited for each user;</td>
</tr>
<tr>
<td>• Great integration features with mobile devices and heart rate monitors;</td>
<td>• Does not take into account special populations;</td>
</tr>
<tr>
<td>• Existence of default nutritional plans.</td>
<td>• Does not allow training data recording in real time;</td>
</tr>
<tr>
<td></td>
<td>• To many features which are obsolete for the great majority of the users and that makes its utilization more difficult;</td>
</tr>
<tr>
<td></td>
<td>• Limited strength training functionalities for those who pretend strength of hypertrophy training.</td>
</tr>
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</table>

Table 1 - VidaOne pros and cons
The most advanced system currently available for Health Clubs is the Wellness System from Technogym. This system is used in Portugal in selected clubs, such as Active Life and Club L. Currently are estimated that its use around the world ascends to 2 million people [Tec09]. Its main purpose is to help users achieve their goals and to allow Health Club owners figure and improve all the aspects of their business. This system has several components that are listed bellow with their main features and purposes:

- Wellness System Key – Used to save the training results and transfer them to the main computer of the facility. It allows integration with other equipment through RFID, such as lockers, vending machines, etc.
- Contact Manager – Allows contact and training plans management. Uses a set of algorithms that generates an automatic alert when the client is at risk of dropping from the club;
- FeedBack Point – Point of information that contains the complete management of all physical activities and training sessions allowing visualization and modification of the different exercises;
- Wellness Expert – Interactive kiosk with a touching screen which allows users to see different information about their training routines and to watch demonstrational videos of all exercises.
- Wellness Trainer – Interface between system and personal trainers. Allows the trainers to manage personal information, training routines, medical tests and creates reports to help the trainer with his client's results.

After a detailed study of the system functionalities and observation of its behavior in real time, we can conclude the following (Table 2):

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
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</thead>
<tbody>
<tr>
<td>• Easy to use;</td>
<td>• Overload of the Wellness Expert and FeedBack Points creates breaks and pauses in training;</td>
</tr>
<tr>
<td>• Improves motivation;</td>
<td>• When a machine is occupied the system does not give information about how the user can readjust its training;</td>
</tr>
<tr>
<td>• Reports with business indicators;</td>
<td>• Does not allow automatic record of free weights training;</td>
</tr>
<tr>
<td>• Efficient trainer time utilization;</td>
<td>• Does not have mechanisms for automatic generation of personalized training plans;</td>
</tr>
<tr>
<td>• Equipment management – balance the level of utilization of each machine, identifies malfunctioning;</td>
<td>• Does not have nutritional support;</td>
</tr>
<tr>
<td>• User can visualize all his information with an online application, Training Room.</td>
<td>• Needs great investment on all the system components.</td>
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</tbody>
</table>

Table 2 - Wellness System pros and cons
After a careful analysis of all the state of art we can conclude several aspects that are listed below:

The applications currently available on the market, although brings some advantages to theirs users are in some way limited in critic points:

- Absence of mechanisms to automatically generate nutritional and training plans personalized to each user characteristics, objectives and needs;
- None of the tested applications takes into concern special populations;
- None of them allows the user to record information in real time during His training sessions, having to do that in paper and pen to latter “import” the values to the application.
- The majority does not allow integration with cardiofrequencimeters.

The Wellness System is a great innovation in this business area that brings new ways to monitor client’s evolution and takes communication between trainers and trainees to another level. Despite its great potential there are several flaws that make it a difficult solution when trying to solve all the business problems. The main disadvantage is its cost. To function at full power all the Health Club machines have to be compatible with the system. In an already implemented Health Club it means the complete waste of all the existing equipment.

**Solution architecture**

To solve the problems explained earlier we suggest a simple architecture with two main modules that allows a better training monitoring and improves client motivation and evolution.

The Figure 3 illustrates the communication system suggested, constituted by two modules, a desktop one and other online and a heart rate monitor. The last one is used by the client during training and the data recorded transferred to the desktop module by cable or wireless.

The desktop module receives data from the online module and that information is inserted in the online application during training with a smartphone or if the client preferred used in any computer with internet access.

The online module also receives data from the desktop application as for instance the training and nutritional plans personalized for the client.
Desktop Module Features
This module is responsible for all information analysis referent to the client’s training and diet. It’s used by the personal trainer and its first utilization should be on the initial interview immediately before the client’s first training session. Its main features are listed below:

- **Automatic creation of training and nutritional plans** – Taking into account the client’s characteristics, limitations, needs, objectives and capabilities.
- **Add new client** – Allows the user to add a new client to the database;
- **Training parameters analysis** – Evaluate evolution, detect stagnation and overtraining and suggest modifications to the training and nutritional plans;
- **Personal Trainer support** – Helps the trainer with graphs and reports of all client’s information;
- **Heart rate monitor integration** – Allows data importation from different heart rate monitors;
- **Reports generation** – Automatic and manual creation of reports with different parameters;
- **Evolution Graphs** – Allows the visualization of different kind of information in form of graphs;
- **Tools** – Makes available a set of tools and calculators of different kind of indicators;
- **Calendar** - Allows navigation and selection of different events on the client’s calendar;
- **Flexibility** – Allow the trainer to customize manually all the nutritional and training plans, the exercise and food database.

Online Module Features
This module is responsible for all the information available to the client and allowing him to record and take note of all information during, before and after the training sessions. Its main features are:

- **Parameter recording** – Allows in training parameters recording such as exercise series, repetitions and loads. It allows also recording of extra training parameters such as mental and physical tiredness and additional notes or observations;
- **Help/Support** – Allows the user to see his nutritional and training plan whenever he desires and makes available different kinds of help such as demonstration videos about how to execute each exercise;
- **Availability** – This module is available through a smartphone or a pc with internet access;
- **Planning** – Allows the user to see his week or monthly planning of trainings and meals;
- **Journal** – Allows the user to create entries in his diary that contains parameters such as rest, observations, keep track of intake and burned calories;
- **File sending** – Allows the user to send hear rate monitor files or photos of himself to be added to reports.
Implementation of the solution

Prototyping
The user interface is a main concern on this kind of applications and therefore it was used an iterative prototyping method to enhance the users satisfaction and ease of learning. The first prototypes were low fidelity and the material used was paper and pen [STG03]. Examples can be seen on Figure X.

![Example screens of the low fidelity prototypes](image)

Figure 4 - Example screens of the low fidelity prototypes

The menus represented in Figure 4 correspond to the second low fidelity prototypes for the desktop and online module. These prototypes were tested with users to find major usability problems at design time, making them easier and cheaper to solve. Nielsen’s heuristics were also applied here and throughout the project. After a number of iterations necessary to achieve a quality low fidelity prototype the next step was the functional prototypes which were evaluated with the same method described. Again, after the necessary iterations the final prototypes were produced and later on tested with real potential users.

Online Module Final Prototype

![Training menu and Training Plan menu of the online module (Final Prototype)](image)

Figure 5 - Training menu and Training Plan menu of the online module (Final Prototype)

In Figure 5 are represented two of the most important screens of the online module. In the left we can see the “Training Menu” in which the user gets information in real time about the exercise he is currently
performing. It also has the purpose to record information given by the user about that specific exercise such as the load used when performing it. Here the user can navigate through all the exercises of his selected training routine and see the status of each one in the current training session. It is also possible to validate or discard an exercise during the training session.

In the right of the Figure is represented the “Training Plan” menu where the user can see all the training routines that are his training plan. Here he can select an exercise and see the instructional video or get more information about the exercise such as the main and secondary muscles involved in the workout.

**Desktop Module Final Prototype**

![Figure 6 - Client’s Information and Conducted Trainings from desktop module (final prototype)](image)

Figure 6 represents two of the most important menus of the desktop module. The first one, on the left, is the “Client’s Profile” menu in which we can see the main layout of the module:

1. **Navigation bar** – Here are the main menus of the application: Client; Training; Diet; Calendar; Evolution; Tools.
2. Here are displayed helps and description about the current menu.
3. Here is the content frame, where all the menus are displayed.
4. **Thread Bar** – here the user can see its current location on the application as well as navigate back and forward. It also contains information about the user and the client being edited.
5. **Other options** – Here are displayed other options of the applications as for example save and open a training plan.

On the second menu, at the right we can see the “Conducted Trainings” in which the user can select a past training session and see all the information available about it. In the figure we can also see the heart rate graph that was imported from the heart rate monitor used during training.
Testing the solution

Online Module Results
The Figure 7 represents the results of the tests using the online module. It is represented the execution time (in seconds) for 15 tasks given to 20 users each from all ages and different levels of use of technology experience. As we can see the results surpassed the expected times and from the 1st to the 2nd tests we experienced a dramatic improvement. These results demonstrate the great usability of the prototype and its ease of learning and memorization. At the end of the testing session a satisfaction survey was conducted in which the user’s satisfaction was graded as 5.6 in a scale of 1 to 6.

Desktop Module Results
The Figure 8 represents the results of the tests using the online module. It is represented the execution time (in seconds) for 15 tasks given to 20 users each from all ages and different levels of use of technology experience. As we can see the results surpassed the expected times and from the 1st to the 2nd tests we experienced a dramatic improvement. These results demonstrate the great usability of the prototype and its ease of learning and memorization. At the end of the testing session a satisfaction survey was conducted in which the user’s satisfaction was graded as 5.4 in a scale of 1 to 6.
Conclusions

The business of Health Clubs is growing each year, not only in Portugal, but all around the world, and as in all other businesses technology can be very important and a good way to improve client’s satisfaction and increase profits.

The Wellness System from Technogym is maybe the best and more complex system implemented in this business currently but has many flaws namely its implementation cost.

The work described in this document tries to solve some of the problems in this industry with a simple solution with current technology and low cost of implementation.

The suggest architecture contains two modules. A desktop application used by the personal trainer and an online application used by the client. The first one is responsible for all the data analyze and manipulation, creation of nutritional and training plans and to generate reports with all the evolution of the client. The last one gives information to the client and makes available tools for recording training marks in real time.

In the Figure 9 are summed the main issues of the business and the way the solution described is capable of solving them.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
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<tbody>
<tr>
<td>Lack of support during training sessions</td>
<td>Online Module with video and text support in real time during training</td>
</tr>
<tr>
<td>Lack of nutritional support</td>
<td>Automatic creation of nutritional plans that can be adapted to any kind of users and visualized anywhere, anytime through the online module.</td>
</tr>
<tr>
<td>Lack of knowledge</td>
<td>Educational texts and videos about each different exercise.</td>
</tr>
<tr>
<td>Difficulties in monitoring client's evolution</td>
<td>Graphs with different training and extra training parameters that can be compiled into detailed reports with client's evolution for a given time.</td>
</tr>
<tr>
<td>Low sells in supplementation products</td>
<td>Automatic suggestion of suited supplements to the client that can be adjusted to a specific brand.</td>
</tr>
</tbody>
</table>

The evaluation of the solution had several steps aimed for the usability excellence. The functionality efficacy was assured by surveys and interviews conducted with personal trainers and nutritionists to validate all the requirements of the application. The final prototypes were subjected to a battery of tests which results were completely satisfactory. Both usability tests and user satisfaction survey surpassed the expectations and give us a reason to believe in the quality of this product that could be applied into these business area and solve or minor the issues stated before focusing the business attention in the client and the tasks he executes becoming easier to manage their expectations.
References


