

Telligen Health Tracker

IST 654 - GROUP 9

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Executive Summary

Telligen's goal is to solve healthcare challenges that are being faced by its diverse clients, by delivering improved health solutions to them. In order to achieve that goal, Telligen must continually find ways to deliver solutions that will improve quality and lower costs by leveraging its deep clinical and technical expertise. One new way to do so, is by developing a system that will track the health records of clients' employees, generate reports for different stakeholders thereby offering healthcare intelligence.

The system is expected to increase revenues by improving productivity and marketing it to potential clients. The use of a one-stop platform such as an application and website will increase efficiency and quality of service of all clients of Telligen. The system will be able to track and store health records of employees and will generate reports to determine their health condition. It will also monitor the nutrition, calorific values, and daily physical activities of each employee and will help the coaches determine appropriate nutrition and exercise levels. We believe that this new system will bring net present value of \$150,000 and is a long-term investment of at least 6 years. The return on investment is estimated to be 10.30% annually. The initial investment for the project is expected to be \$162,000 with an annual maintenance cost running between \$15,000 and \$25,000.

The project has begun with requirements gathering and analysis as per conversation with client. This document includes the Systems analysis and design documents developed in the process of evaluating and determining the Telligen's needs. It includes the system requirements, a use case analysis, data flow diagrams, entity relationship diagrams, and feasibility analysis. This document also includes major interface prototypes and a proposed implementation plan.

Project Name

Telligen Health Tracker

Project Sponsor

James Stewart,
Delivery Manager,
Telligen, West Des Moines, IA.

Team Members

- 1. Project Manager
- 2. Business Analysts
- 3. Developers
- 4. UI Designers
- 5. Quality Assurance Personnel
- 6. Business Testers

Project Overview

Project Objectives

To create an automated health tracker system for Telligen, that will:

• Allows people to have a relationship with a coach to motivate them to maintain their health.

- Reduces the need of manual entry when the application is integrated with the wearable devices
- Records the medical information such as biological records and health related information of the employees into the database
- Generates different reports for the users Coach, Employees, and Admin
- System users can set reminders and receive event notifications.
- Calculate the number of calories consumed per day and record the daily activities performed by the user.
- Dial 1800 or chatbot feature provided in the system for technical support.
- Can book, edit or accept an appointment for an employee or Telligen coach.
- Employees can partake in a video call to Telligen coach to ask any health-related queries.

Project Scope

- Understanding Healthcare Organization's vision, culture and the type of work environment.
- Capturing relevant information from organization's historical data populated from the existing systems.
- This project does not involve the development of the proposed system, unless Telligen extends the contract of work.
- This project will analyze and propose an automated health tracking system that will improve quality of service and efficiency in regard to the existing solution that Telligen uses.

Project Overview

Telligen, a health consultancy firm, is responsible to deliver solutions to its clients that are facing health related problems. It has diverse clients that are running its business in different domains. Telligen aims at delivering solutions that improves the quality of life of the people at a lower cost by leveraging deep clinical and technical expertise.

Thus, the project aims at designing and developing the system such that it will track the health records of clients' employees, generate reports for different stakeholders thereby offering healthcare intelligence.

Stakeholders

- Telligen Coaches who are consulting the employees with their health-related queries.
- Employees who are using the system to enter their health-related information.
- Admin who are present at the employee's end but are responsible for monitoring and managing the health tracking system.
- Telligen management, whose support is needed for the success of the project.

Criteria of Success

- It is a successful project when it meets the following Criteria:
- The User Acceptance test result reaches 70% and more.
- The system is fully integrated with mobile software and be able to connect to the wearables and Fitbit.
- Employees are able to enter and track their activities and food intake.
- Coaches are able to access employees' activities and be also able to suggest and monitor employees' performance.
- The application reach 100,000 users within the first 2 years.

Business Benefits

The system will:

- Increase the efficiency and effectiveness of the employees.
- Help Telligen expand their contracts with other clients.
- Increase the wellness of employees.

- Reduce the risk of losing people especially diabetes and people with heart issues.
- Encourage employees to join challenges and get involved with their colleagues every day.
- Increases the revenue of Telligen.
- Provide a well-designed reports for employees and coaches.
- Encourage employees to Exercise through the integrated rewarding system.

Requirements

Requirement Gathering Methodology

- Interview: Most of the information in this report was gathered from a series of interviews partaken with Anthony.
- Survey/Questionnaire: Getting information from patients and existing clients' employees on what features they would like if such an application were developed was helpful in building out the application.
- Focus Group Meetings: Having meetings with focus groups helped us identify key functionalities and industry standards regarding health apps.

Functional Requirements

ID	Title	Priority
FR_10001	The website should allow users to login using their credentials.	High
FR_10002	The system will have to allow employees to log their level of activity.	High
FR_10003	Employees should be able to add daily nutrition.	High
FR_10004	Employees must be able to add height and weight.	High

FR_10005	Employees should be able to add their current Blood pressure and Blood sugar readings.	Medium
FR_10006	A Primary physician or Coach should be able to alert an employee to check Blood Pressure or Sugar levels at set intervals based on their discretion.	Medium
FR_10007	An employee should be able to enter blood work test results and cholesterol of an employee under their supervision.	Medium
FR_10008	All employees can view their reports - such as weekly activities performed, and calories consumed.	High
FR_10009	Employees with diabetes or high blood pressure are able to view specific weekly reports for Blood Sugar levels and Blood Pressure levels.	High
FR_10010	The system matches Employees activities to challenges - at a group or individual level.	Low
FR_10011	Coaches should be able to customize diet programs for their assigned Employees.	High
FR_10012	Employees are able to view their daily calorific limit and exercise goal on logging in - which updates whenever some data is added.	High
FR_10013	The system should enable each client to have his own customizable environment	Low
FR_10014	The system should provide sessions for meditation and positive messages for employees	Low
FR_10015	The system should handle at least 100000 users.	Medium
ED 10015	Admins must have access to de-identified aggregate visual (bar/pieetc.) and tabular reports for activity, % of employees at high risk from blood pressure and sugar at a	
FR_10016	weekly/monthly level.	High

	Coaches must have exact data for all employees under them, with capability for ad-hoc reports for nutrition, activity, blood	
FR_10017	pressure/sugar with drill-down to individual employee level at weekly/monthly levels.	High
FR_10018	All employees should be able to view a calendar	Medium
FR_10019	On selecting a date from the calendar, an employee can view/edit their activities/nutrition for that day.	Medium
FR_10020	Employees should not be able to enter activities or nutrition for a future date.	Medium
FR_10021	On selecting a future date, employee can set reminders.	Medium
FR_10022	An Admin can create events' alerts which should be displayed on the employees' calendars.	Medium
FR_10023	The system should notify the coach whenever an employee enters a nutrition value that exceeds the standard values.	High
FR_10024	The system should be able to support multimedia such as videos.	Low
FR_10025	The coach should be able to view historical records of the employees under them.	High
FR_10026	Employee should be able to set an appointment to make video call with the coach for health-related queries.	Low
FR_10027	The application must allow a video calling feature between the employee and the coach.	Low
FR_10028	An Admin should be able to import spreadsheet data about employees into the new database.	Low
FR_10029	An Admin should be able to add, remove or edit employees within their organization.	High
FR_10030	The system should have a rewarding feature for employees - as individuals or groups.	Medium

Non-Functional Requirements

ID	Title	Priority
NFR_10001	The language used on the system should be simple and easy to understand by the employees.	High
NFR_10002	The application should be scalable for future users.	High
NFR_10003	The application should be compatible with smart watches and Fitbit for activity and heart rate.	Medium
NFR_10004	Employees should be able to backdate their activity and nutrition according to the Admin policy.	Medium
NFR_10005	Users should be able to use chatbot/dial 1800 for technical support.	High
NFR_10006	Employees should be able to interact with their coaches through live chat/phone regarding personal health queries.	Medium
NFR_10007	Coaches should be able to refer to primary physicians in case of emergency at any time.	Low
NFR_10008	The system should have a database which includes preset values for the calorific count of different food items for the nutrition tracker.	High
NFR_10009	The application should be integrated with smart phones' voice assistance.	Low
NFR_10010	Employee have the option to share his information or not.	Medium
NFR_10011	The application should have the ability to track employees' sleep.	Low
NFR_10012	Each client must have at least 3 admin users.	High
NFR_10013	The application should not be connected to emergency numbers such as 911.	High

NFR_10014	The login for both the website and the application should be secure and have 2-factor authentication (fingerprint/strong password/SMS pin/questions).	High
NFR_10015	The System shouldn't allow adding photos for the employees nor the admins.	High
NFR_10016	The mobile application should be compatible with IOS and Android.	High

Assumptions, Constraints and Risks

- It was assumed that Telligen modern outlook, risks need to be documented due to the inherent resistance to change by the people.
- A Tape Backup System is assumed to already exist within Telligen.
- Workstations for Development and Testing are assumed to already exist within Telligen.
- 802.11ac WAP is assumed to already exist within Telligen.
- Physical Cabling is assumed that it already exists within Telligen.
- A UPS is assumed to already exist within Telligen.
- We assume that each developer and tester have their own workstations already and have no need of a virtual machine to connect to the cloud service and perform their development and testing activities.
- It was assumed that the cost of UI Designers is \$100/hr.
- It was assumed that the cost of Quality Assurance Personnel is \$65/hr.
- It was assumed that the cost of Business Analyst is \$ 65/hr.
- It was assumed that the project can span 4 months for the first phase implementation.
- It was assumed that the cost of Project Manager is \$ 65/hr.
- It's assumed that if data is being obtained from Fitbit or Apple Watches, proper permissions need to be extended to users so as to ensure legal protection.

- We assume around \$15,000 for maintenance for the first year of operation, and a 10% overall increase in operability costs - including operational, corrective and preventive maintenance, while maintaining a 10% discount rate.
- We assume the benefits that are expected. Based on the three scenarios considered, we have a variety of benefits and rate of growth explored in the economic feasibility.
- The cloud used for setting up the servers and application, needs to be ISO 27018 compliant to ensure PII security.
- The health tracker needs to distinguish itself amongst the slew of products that are flooded in the marketplace and characterize itself as better than paid or even free ones by showing its USP to the world.

Feasibility Analysis

Telligen needs a good platform that could track the health and fitness of people. To implement this solution, we need to determine the right technology. This section will discuss different aspects of feasibility that are considered to accomplish the requirements and goal of the platform. Thus, to achieve this we set all the basic requirements, and then browse through all the available solutions considering the user's opinions and usage behavior.

Operational Feasibility

Security

All types of users like Telligen coach, employees, and admins must login through the system to gain access. Authentication feature will restrict unauthorized access to the system. Each user will have different roles and privileges for read/write access so depending on their roles the security features will be developed.

Backup and Legacy Data Management

In order to retrieve historical medical records of customers, there is need to archive these historical data and store in the servers. As per HIPAA laws, at least 10 years' worth of data need to be preserved after ending of contract. So, system should be developed keeping in mind the archiving operations.

Data duplication should be planned with some level of redundancy between databases in order to have backup in case of system failures. For backup, disk and tape backups would be planned, in tune with Telligen's regular process. Also, the data files can be stored in cluster servers to ensure server availability.

Updating

The system should be able to update easily online to higher version. Users will always be notified whenever an update is available through the App Store or Play Store.

Data Source

The customer/employee details like health records will be stored in the backend database that will be connected with system via the mobile application or website. The data will be shared or presented in the same data type as stored in the database, formatted in a readable format.

Availability

The system should be available 24 hour and its availability will depend on the internet services. Thus, the speed of the internet (4G/LTE service for users) will also be an important factor. The web and database servers need to be available for the ability to log in.

Cultural Feasibility

User Friendliness

The system will be used by employees, admins, and Telligen coaches. Thus, the system should be user friendly so that it is simple and easy to use. The system should have a 6-8th grade reading level so that it provides usability to a vast majority of people. In addition, a wide spread of people like Telligen coaches and employees - most of whom are non-technical, from different companies will use this application. On this point, there should be an option to change the language for users to enhance experience with support for localization as well.

Management support

Management support at all levels should be publicly communicated. Although cultural feasibility is expected in the project, assuming that Telligen modern outlook, risks need to be documented due to the inherent resistance to change by the people. Feedback from coaches to management can help assess cultural issues they are facing.

Training

There is need to train the employees to use the system - specifically the coaches from Telligen's side and the admins from the client companies. The training for the employees will be handled by the admins and this could be achieved by integrating training videos or tutorials within the system. IT staff and technical support from helpdesk is expected too.

Technical Feasibility

The following are the hardware requirement estimated for the project:

2 x Web Server (for ability to serve at least 100 users concurrently)

3 x Database Servers (for redundancy, and it is better for security and scalability to have separate web and database servers)

Tape Backup System - assumed to already exist within Telligen
4 iPhone Phones for Testing
4 Android Phones for Testing
Workstations for Development and Testing - assumed to already exist within Telligen
802.11ac WAP - assumed to already exist within Telligen
Physical Cabling - assumed to already exist within Telligen
UPS - assumed to already exist within Telligen

The web server is designed to be the point of interface for user experience. It must additionally support all application related operations such as process queries, transmit results etc. We have 2 web servers as one is introduced as a redundancy. In case one fails, the other should be able to take charge and perform the other's tasks seamlessly to the end user. It would also help with load balancing in times of high traffic of writing or reading employee data or when one needs to be taken down for maintenance. The web server is expected to perform the tasks of the database server as well. Since all the LANs are connected for all the locations Telligen operates out of, only one set up is required for access to information. This doesn't matter, of course, for the mobile aspect of the application.

Hence, if a coach is anywhere in Telligen's network, he/she would be able to connect to the web/database servers easily and view the same reports.

Network:

Each office location is expected to already have a local area network, and connection to a wider WAN for networking amongst offices in different locations. Leveraging this architecture will allow coaches from all over, to monitor employee details wherever they may be.

A star network, with a smart network switch can help connect all workstations and manage general traffic. Routers are also expected to be there as part of Telligen's already existing network.

Proxy is something that need not be looked into as it would be taken care of by the application connection itself.

All the coach workstations and mobile phones used by employees should be Wi-Fi 802.11 ac compliant for future proofing and quick data transfer with MIMO. Wireless Access Points are not needed for coach workstations, but might be useful if they'd like to access through mobile. So, assuming Telligen already has this capability, as most companies do, it shouldn't be an issue.

The application itself should be able to interface with Bluetooth powered wearable technologies, interface with smartphones.

Enterprise Resource Management:

Enterprise-wide systems can help communicate relevant information to all employees within the organization who need the information. Portals also form an integral part of this. The online portion of the application should be accessible to Coaches and Admins (clients).

Scalability:

The Health system should be able to expand to its full capability of 100,000 end users. Initially, only a test of 100 users will be initiated during the UAT portion, before the production release. The use of Client/Server architecture can help with scaling up easily.

Legacy Systems:

The tracker must be able to link with existing Telligen systems. Care must be taken for data formats in particular, like employee names and details, which may already exist in some systems, and also in the Health Tracker. If information is updated in one, it should be available to be updated in the others, through a Master Data Management Systems.

Web Integration:

Having a web-centric architecture can help integrate all future applications that Teligen can develop.

Version Control:

Version Control for the mobile application will be maintained by using Git. As and when a new version is released, the updated version will be added into the repository and backup will be maintained.

Processing:

The system should be able to process all the data entered online, and not in batches. Since we deal with current health details such as heart rate, blood sugar, these may need to be updated ASAP, and not at a later stage, so that the coach may be notified of any anomalies or dangerous values.

However, from an admin point of view, batch processing is fine for entering employee data, or event planning, or challenges from the coach's perspective into the system, perhaps at the end of the day.

The most popular model to go with technologically, for hosting, is the LAMP configuration i.e.:

Main OS of choice: Linux

Linux was chosen as the main OS of choice. Windows was also considered, however, was ultimately decided against as there are a lot of malware present for windows systems. Linux, which is an open source OS, is an offshoot of the much sounder and iron-clad Unix OS.

Web Server: Apache Tomcat Server

Apache was the Web-Server of choice. IIS was also considered, but ultimately Apache was chosen due to its expansive feature set, ability to allow server-side scripting and excellent security. Apache was chosen, despite it not being an application server, as it

would perform a lot of tasks required of it as the connecting layer - and is used as application server for specifically web-based applications. Additionally, IIS is plagued by its glaring vulnerability due to the inherent weakness of its OS - for example, the Code Red Worm incident.

Database Management System: MySQL

MySQL was chosen as a relational structure can really help administrators to easily control user and network access to data. A NoSQL database is not really needed as the load that it handles and analytics that need to be performed are not at that large a scale. The system as a whole must be distributed in nature, which is easy to envision as MySQL offers it.

Web Programming and Development:

Client Side: JavaScript (with HTML and CSS integration)

Server Side/Mobile App: Python

Python was chosen due to its versatility and flexibility compared to something like PHP, which is tightly regulated. Additionally, applications written in Python are considered to be the safest in terms of software security. Most importantly, it is very easy to integrate Python into a mobile app development environment - as iOS and Android have a port each, to allow for developing native web apps from Python.

However, on further reflection on the cost benefits, we see that maintaining 2 web and 3 database servers itself costs nearly 3/4th of the initial budget. Such an investment for a short period of time such as 3 years doesn't seem feasible.

Potential Solutions:

Telligen could look into Packaged Solutions with limited ability to customize application homepages for client admins, and ability to manage data. An in-house solution could prove to be very expensive, and not necessary as the level of customization needed in

the application for individual clients is not very high. In addition, there are several areas of expertise that Telligen lacks sufficient experience in, an example being UX development - so having In-House solution doesn't look great. Service providers don't seem like excellent options either as it would have confidential client data stored in database servers, not in Telligen's physical grasp. However, it seems most economically feasible, along with contractors for technical abilities that Telligen lacks – such as UI designers.

Looking at cloud options, we see that the cost of a Virtual server with firewall setup such as what we envision is approximately $\$3,750 \times 4 = \$15,000$. Here, we assume that each developer and tester have their own workstations already and have no need of a virtual machine to connect to the cloud service and perform their development and testing activities.

A MySQL database can be used with many cloud based services, such as Amazon Web Services, which can help keep the cost down, compared to something like Oracle.

Using a load balancer and a reverse proxy server can also be considered, which is also compatible with most web services, such as AWS - this has not been considered for the overall budget, since they are optional and more geared towards performance.

Licensing:

All the technologies are open source, and easily accessible and obtainable to start working. Ownership shall not pose a problem, ad can be easily modified as per user preference to create a customized user application. Apache and Linux and MySQL Community, and Python are all available so as long as they are given proper copyright disclaimers and notices.

Technical Expertise:

The following roles are foreseen as pivotal in the project to come:

Software Developers - \$100/hr System Administrators - \$65/hr UI Designers - \$100/hr (assumption)
Quality Assurance Personnel - \$65/hr (assumption)
Technical Support Staff - \$50/hr (assumption)
Project Manager - \$70/hr
Business Analyst - \$65/hr (assumption)

Telligen has skilled coders and system administrators, however, they are lacking in UI resources. So, this could be contracted out to third party sources.

Offshoring, while lucrative, doesn't seem like the way to go as there is a very quick turnaround required between the regular developers and UI designers, so while offshoring to other countries can drastically decrease cost, it would increase the time needed, and restrict the schedule.

Economic Feasibility

The budget for the project was set at \$250,000.

From our assumptions, we think the project can span 4 months for the first phase implementation. This project would be requiring a substantial amount of technical expertise and hardware costs - especially since the number of users a server supports simultaneously is 50 and 100 users are expected to be using it during the first rollout.

Software Developers - \$100/hr

System Administrators - \$65/hr

UI Designers - \$100/hr (assumption)

Quality Assurance Personnel - \$65/hr (assumption)

Project Manager - \$ 65/hr (assumption)

Business Analyst - \$65/hr (assumption)

The project manager is expected to work throughout the duration of the project - so his/her resource fee will be included for the full duration of the project. For all other resources, only the amount of time they need to work will need to be mentioned.

So, the project manager: $$65 \times 155 \times 4 = $43,400$

Now, looking at system administrators, they are needing to work for 1 hour a month for server maintenance. Since we have 2 web servers and 3 database servers, all in the cloud, we have 5 hours a month, and with the project implementation lasting about 3 months, we have <u>15 hours per month</u>.

In addition, we have a set up time of 3 hours per server. As we have a 6 Sprints, we have 6 instances where the servers need to be set up, and also for production and business user testing. Also, we plan to have development and testing environments (2x) for every sprint we undertake. So, we have

$$(6+1) \times 5 \times 3 \times 2 = 210 \text{ hours}$$

So, we have the total time for System admins at 210 hours, bringing their estimate to \$13,650.

Looking at Developers and UI resources, we estimate that they would have about the same each.

With a development time of about 2 months for coders, the number of hours worked by one employee would be $155 \times 2 = 310 \text{ hours.}$

UI would have less work in comparison, so we estimate it at around 1 month = <u>155</u> hours

Developers - 310 x 100 = **\$31,000** UI - 155 x 100 = **\$15,500** With a testing time of 2 months, the number of hours is $\underline{\mathbf{310 \ hours.}}$ Testing - $310 \times 65 = \underline{\mathbf{$20,150.}}$

Business Analysts' work would be focused on the design apart, and perhaps a little on the planning side. So, we estimate the time for BAs to be 2 months. Business Analyst - $2 \times 155 \times 65 = \$20,150$.

Total estimate for Employee Cost is approximately \$143,850.

Moving on to material, we assume that Telligen already has workstations for developers and testing employees to use. In addition, we also assume the existence of cabling, routers, UPS backup, tape backup capabilities that already exist within Telligen.

Here is the estimate of material needed:

2 x Web Server (\$36,000) (for ability to serve at least 100 users concurrently)

3 x Database Servers (\$36,000) (for redundancy, and it is better for security and scalability to have separate web and database servers)

Tape Backup System - assumed to already exist within Telligen

4 iPhone Phone for Testing (4 x \$600)

4 Android Phone for Testing (4 x \$400)

Workstations for Development and Testing - assumed to already exist within Telligen

802.11ac WAP - assumed to already exist within Telligen

Physical Cabling - assumed to already exist within Telligen

UPS - assumed to already exist within Telligen

We will be requiring 2 web servers for allowing processing of at least 100 users' requests concurrently. We also plan to have 3 database servers to remove the load of having the queries done in the web server itself. Furthermore, having other servers improves our security, as there is no single point of failure or entry. - Having multiple database servers can also help establish a master-slave replication system, helping with redundancy.

Since we have two web servers for each sprint, and three database servers also. We have 6 sprints planned overall. Now, looking at the overall scene of things, we need at least 4 environments - Development, Testing, Business User/Training environment and Production environment.

For each sprint we can clear the environment and reuse the same server for testing and development.

So, we have $4 \times (2 + 3) \times (\$750) = \$15,000$

We also need some iPhones and Android phones, maybe 4 each, for testing - overall estimated to be $4 \times (\$600 + \$400) = \$4,000$.

Overall, we're around \$162,000.

Looking at maintenance costs, we can consider that about 10 % - let's say **\$15,000** can be set aside for maintenance for the first year. For each year henceforth, we can assume an increase in cost for overall maintenance - including operational, corrective and preventive maintenance, by about 10% every year.

We can also consider a standard, reasonable discount rate of <u>10%</u>. Discount rate values are checked from look up charts. Annual costs are calculated by considering the aforementioned discount rates and maintenance values.

Accumulating all these values, one's able to see the total present cost.

For profit, let us consider a few perspectives:

1. If we assume large profits in the first year of implementation, assuming a lot of Telligen's existing clients are able to use this technology, lets estimate the first-year profits at **\$112,000**. We assume a standard increase in profits through

- diversification and subtle refinements, by about <u>10%</u> every year not entirely achievable.
- 2. If we assume decent profits in the first year, assuming that a lot of Telligen's customers are not involved in this project, we can assume the first-year profits to be \$90,000 about 50-60% of our initial investment. This way, through aggressive marketing, more clients need to be actively seemed out and existing ones should be tried to be integrated. Hence, we should be looking at a large % increase every year round 40%, quite unreasonable.
- 3. Considering a more realistic, yet optimistic scenario, we could consider an initial profit of **\$81,000** 50% of the initial investment. Also, additionally considering a humble 5% increase in profits every year, we could end up with a more realistic estimate of total benefits.

All the scenarios have budgets under \$250,000, which was the initially agreed budget. Based on the analyses below, we've concluded that Scenario 3 is possibly the best and most reasonable.

Scenario 1: ROI

Year	0	1	2	3	4	5	6
Initial Investment	162,000.00						
Maintenance	0.00	15,000.00	16,500.00	18,150.00	19,965.00	21,961.50	24,157.65
Discount Rate at 10%	1.00	0.91	0.83	0.75	0.68	0.62	0.56
Present Value of Cost	162,000.00	13,635.00	13,629.00	13,630.65	13,636.10	13,638.09	13,624.91
Total Present Value of Cost	243,793.75						
Benefits	0.00	90,000.00	126,000.00	176,400.00	246,960.00	345,744.00	484,041.60
Discount Rate at 10%	1.00	0.91	0.83	0.75	0.68	0.62	0.56
Present Value of Benefits	0.00	81,810.00	104,076.00	132,476.40	168,673.68	214,707.02	272,999.46
Profit	-162,000.00	-93,825.00	-3,378.00	115,467.75	270,505.34	471,574.27	730,948.82
Total Present Value of Benefits	974,742.57						

Return on Investment =
(Total Benefits - Total Cost)/Total Cost
= 299.82%

Annual ROI =
Return on Investment/Periods
= 49.97%

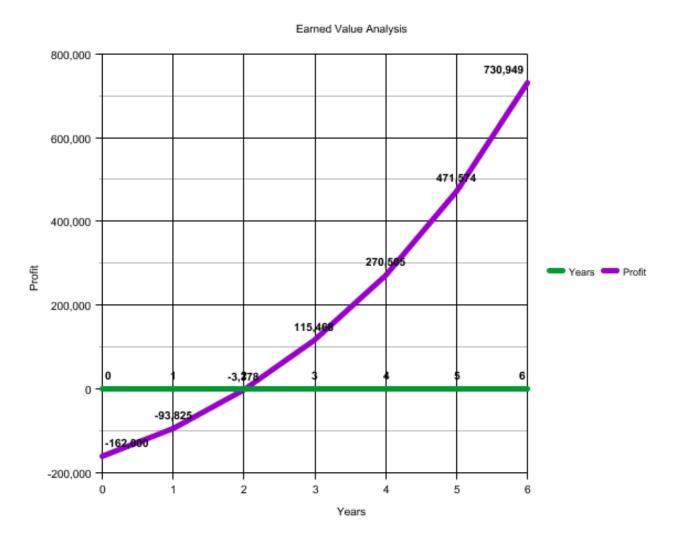
Scenario 1: NPV

Year	0	1	2	3	4	5	6
Initial Investment	162,000.00						
Maintenance	0.00	15,000.00	16,500.00	18,150.00	19,965.00	21,961.50	24,157.65
Discount Rate at 10%	1.00	0.91	0.83	0.75	0.68	0.62	0.56
Present Value of Cost	162,000.00	13,635.00	13,629.00	13,630.65	13,636.10	13,638.09	13,624.91
Total Present Value of Cost	243,793.75						
Benefits	0.00	90,000.00	126,000.00	176,400.00	246,960.00	345,744.00	484,041.60
Discount Rate at 10%	1.00	0.91	0.83	0.75	0.68	0.62	0.56
Present Value of Benefits	0.00	81,810.00	104,076.00	132,476.40	168,673.68	214,707.02	272,999.46
	-	-					
Profit	162,000.00	93,825.00	-3,378.00	115,467.75	270,505.34	471,574.27	730,948.82
Total Present Value of Benefits	974,742.57						

Net Present Value =
Total Benefits – Total Cost
= \$730,949

Scenario 1: Payback Analysis:

Payback Period: **2 years.**



Scenario 2: ROI

Year	0	1	2	3	4	5	6
Initial Investment	162,000.00						
Maintenance	0.00	15,000.00	16,500.00	18,150.00	19,965.00	21,961.50	24,157.65
Discount Rate at 10%	1.00	0.91	0.83	0.75	0.68	0.62	0.56
Present Value of Cost	162,000.00	13,635.00	13,629.00	13,630.65	13,636.10	13,638.09	13,624.91
Total Present Value of Cost	243,793.75						
Benefits	0.00	112,000.00	123,200.00	172,480.00	241,472.00	338,060.80	473,285.12
Discount Rate at 10%	1.00	0.91	0.83	0.75	0.68	0.62	0.56
Present Value of Benefits	0.00	101,808.00	101,763.20	129,532.48	164,925.38	209,935.76	266,932.81
Profit	-162,000.00	-73,827.00	14,307.20	130,209.03	281,498.31	477,795.98	731,103.87
Total Present Value of Benefits	974,897.62						

Return on Investment = (Total Benefits - Total Cost)/ Total Cost = 299.89%

Annual ROI

= Return on Investment/Periods = 49.98%

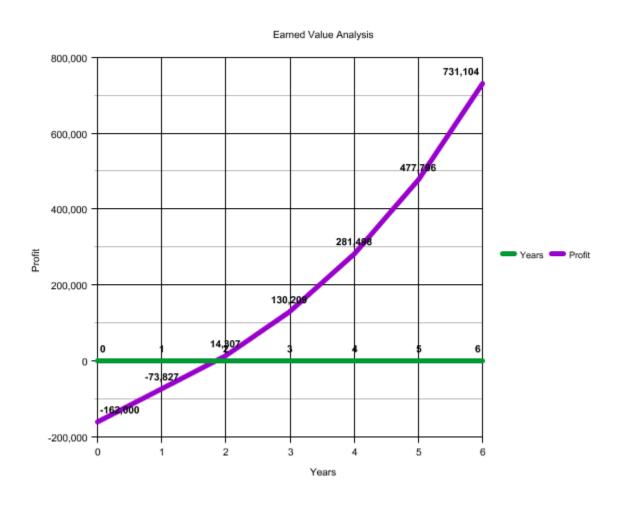
Scenario 2: NPV

Year	0	1	2	3	4	5	6
Initial Investment	162,000.00						
Maintenance	0.00	15,000.00	16,500.00	18,150.00	19,965.00	21,961.50	24,157.65
Discount Rate at 10%	1.00	0.91	0.83	0.75	0.68	0.62	0.56
Present Value of Cost	162,000.00	13,635.00	13,629.00	13,630.65	13,636.10	13,638.09	13,624.91
Total Present Value of Cost	243,793.75						
Benefits	0.00	112,000.00	123,200.00	172,480.00	241,472.00	338,060.80	473,285.12
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Profit	-162,000.00	-73,827.00	14,307.20	130,209.03	281,498.31	477,795.98	731,103.87
Total Present Value of Benefits	974,897.62						

Net Present Value = \$731,104

Scenario 2: Payback Analysis

Payback Analysis: **1 year and 10 months.**



Scenario 3: ROI

Year	0	1	2	3	4	5	6
Initial Investment	162,000.00						
Maintenance	0.00	15,000.00	16,500.00	18,150.00	19,965.00	21,961.50	24,157.65
Discount Rate at 10%	1.00	0.91	0.83	0.75	0.68	0.62	0.56
Present Value of Cost	162,000.00	13,635.00	13,629.00	13,630.65	13,636.10	13,638.09	13,624.91
Total Present Value of Cost	243,793.75						
Benefits	0.00	81,000.00	85,050.00	89,302.50	93,767.63	98,456.01	103,378.81
Discount Rate at 10%	1.00	0.91	0.83	0.75	0.68	0.62	0.56
Present Value of Benefits	0.00	73,629.00	70,251.30	67,066.18	64,043.29	61,141.18	58,305.65
		-					
Profit	-162,000.00	102,006.00	-45,383.70	8,051.83	58,459.02	105,962.11	150,642.84
Total Present Value of Benefits	394,436.59						

Return on Investment = (Total Benefits - Total Cost)/ Total Cost =61.79%

Annual ROI

= Return on Investment/Periods = 10.30%

Scenario 3: NPV

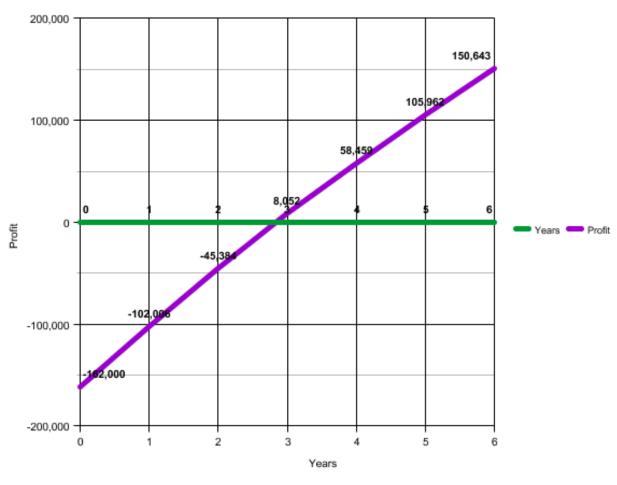
Year	0	1	2	3	4	5	6
Initial Investment	162,000.00						
Maintenance	0.00	15,000.00	16,500.00	18,150.00	19,965.00	21,961.50	24,157.65
Discount Rate at 10%	1.00	0.91	0.83	0.75	0.68	0.62	0.56
Present Value of Cost	162,000.00	13,635.00	13,629.00	13,630.65	13,636.10	13,638.09	13,624.91
Total Present Value of Cost	243,793.75						
Benefits	0.00	81,000.00	85,050.00	89,302.50	93,767.63	98,456.01	103,378.81
Discount Rate at 10%	1.00	0.91	0.83	0.75	0.68	0.62	0.56
Present Value of Benefits	0.00	73,629.00	70,251.30	67,066.18	64,043.29	61,141.18	58,305.65
		-					
Profit	-162,000.00	102,006.00	-45,383.70	8,051.83	58,459.02	105,962.11	150,642.84
Total Present Value of Benefits	394,436.59						

Net Present Value = \$150,643

Scenario 3: Payback Analysis

Payback Analysis: 2 years and 9 months





Schedule Feasibility

The schedule of the project has taken into consideration the importance of the project in addition to the need and useful features the project will provide. The project will take around 16 weeks to be completed, which includes the design, development, and testing of the entire project to make sure that Telligen will have the project in a short time without contradicting with their daily services.

Schedule Feasibility also covers the training of Admins and coaches. With a well-designed courses and guides, Telligen Admins and Coaches will master the new application and the new services available in the website, so that they can start working in it immediately after the decision of Telligen Management. The Agile method is the most efficient method for such project; therefore, the project team will be following it to make sure that the project will finish within the specified time frame. Moreover, the newest version of MS Project will be used in order to track all changes and ensuring that the team is following the right plan. The project was planned as follows:

- The project should start the Second day of April.
- Planning will be the first phase and it will last for three weeks.
- Design should start one week after the planning phase start and will be in parallel with planning, where after completing any part of the planning it will be moved to the design.
- Design will last until the end of May.
- Coding phase will start on April 30th, and will continue in parallel with design phase, where at the completion of any milestone in the design phase, the coding team will start and code that milestone.
- Testing phase will start two weeks after the coding starts and will be in parallel with the coding phase. When the coding team finishes any part of the system, as soon as testing phase begins, the testing team can provide the feedback.
- User Acceptance Testing will go on for a week from July 23rd to July 30th, after regular testing of the application is done.
- The support will be available at the whole time of the project to ensure meeting the desired result with the highest standards.

- Training on the new system for Admin people and Coaches will start on July 23rd and will last until July 30th - the same duration as UAT.
- The project will be delivered to Telligen on July 31st.

The following Gantt Chart shows the entire timeline of the project:



Legal Feasibility

Since a lot of Personally Identifiable Information is being handled by Telligen, there are a lot of legal and compliance issues that need to be considered:

- Legal team must go through all contracts that are needed to be undertaken such as possible offshoring/contractors to ensure appropriate version control and subsequent support.
- There needs to be proper approval set up whenever new patient data is collected, which are all liaised at times by the legal team to ensure compliance.
- All proprietary software needs to be patented appropriately and documented.
- Usage of any licensed software or tools henceforth needs to be properly documented and approved so as to prevent potential lawsuits.
- All PII patient data must be handled as confidential and sensitive including how they are stored, accessed and transmitted.
- Application must be wary of the HITECH Act Enforcement, HIPAA compliance for storage and transmission of confidential information.
- It would be preferable to have NIST compliance for the project as it deals with Federal Processing standards as compliance with this would help ensure compliance with other regulations such as FISMA.

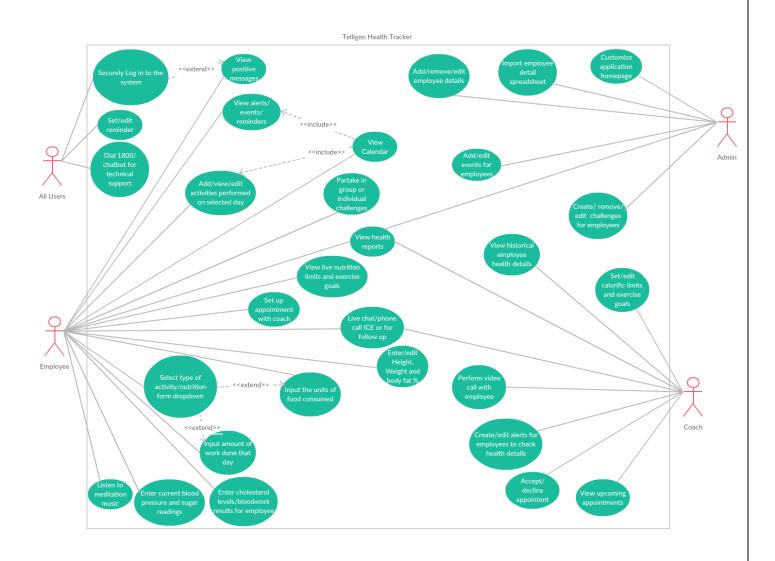
- Its assumed that if data is being obtained from Fitbit or Apple Watches, proper permissions need to be extended to users so as to ensure legal protection.
- Proper releases need to be made to be signed by clients and employees of Telligen using the application to ensure that they cannot wrongfully sue for lack of training on the application.
- How their data is going to be handled needs to be made aware of, to the customer, documented and signed off, so as to prevent potential lawsuits involving mishandling of customer data.
- Fail-safes that are implemented in case of data breach need to be documented so that staff know how to handle the situation and perform damage control.
- Possible legal consequences to data breach in each state in the United States, that Telligen's client is present in, need to be documented and looked into.
- Issues faced might be escalated to the State level of Law, so laws in the states of Maryland, Iowa, Idaho, Massachusetts, Oklahoma, Colorado, Minnesota and Illinois need to be taken into consideration while designing the system and must be compliant to them all.
- An auditing system for tracking when any data is added newly or updated or accessed and by whom at what time needs to be set up for traceability.
- Commitments of technical support for the application needs to be documented both from a legal standpoint of clients, but also for process documentation if coaches within Telligen have queries on how to initiate the process.
- There is a need to maintain the data for all employees involved in the project for 10 years as per HIPAA laws, following which there is a need to physically dispose them.
- The cloud service used for storing the data should be ISO 27018 compliant for ensuring protection of client data and Telligen's legal protection.

These points are not seen as issues as legal team is thought to be capable and expected to oversee various processes as per Telligen's prior experience.

Appendix

Use Case

Diagram



Use Case Glossary

Use Case Glossary		
Use Case Name	Description	Actor
Login	Where the actor can get into the system and start using it as per his need and authority he has.	Employee, Coach, and Admin
Set/ edit reminders	Where an actor can set and edit reminders.	Employee, Coach, and Admin
Dial 1800/ Chatbot for technical support	This is where an actor can contact the technical support weather by dialing 1800 or using the Chatbot service provided in the system.	Employee, Coach, and Admin
View Positive messages	This is where the positive messages are viewed by the employee.	Employee
View alerts/ reminders/ events	This is where the alerts, events, or reminders are viewed.	Employee
View Calendar	This is where the calendar is viewed.	Employee
Add/ view/ edit/ activities performed on a selected day	This is where activities of a selected day are entered, edited, or viewed.	Employee
Partake in group or individual challenges	This is where partake of the employee with groups or individual in challenges are entered.	Employee
View health reports	This is where health reports are viewed.	Employee, Coach, and Admin

View live nutrition limits and exercise goals	This is where the nutrition limits and exercise goals are viewed.	Employee
Set up appointment with coach	This is where the employee can set appointments with his coach.	Employee
Live chat/ phone call ICE or for follow up.	This is where the employee/ coach can contact each other through live chat or phone call for the follow up purposes.	Employee and Coach
Enter/ edit height, weight, or body fat percentage	This is where the body biometrics such as height, weight, and body fat percentage are entered or edited.	Employee
Input of the units of food consumed	This is where the units of foods consumed are entered	Employee
Select type of activity/ nutrition from a dropdown	This is where the types of activities and nutrition are chosen from a dropdown menu.	Employee
Input of amount of work done that day	This is where the amount of work done in the day are entered.	Employee
Enter cholesterol levels/ bloodwork results for employee	This is where the cholesterol levels and bloodwork results are entered.	Employee
Enter current blood pressure and sugar readings	This is where current blood pressure and blood sugar readings are entered.	Employee
Listen to meditation music	This is where the meditation music is selected	Employee
Customize application homepage	This is where the application homepage is edited and customized.	Admin
Import employee detail spreadsheet	This is where the employee detail spreadsheet is entered.	Admin

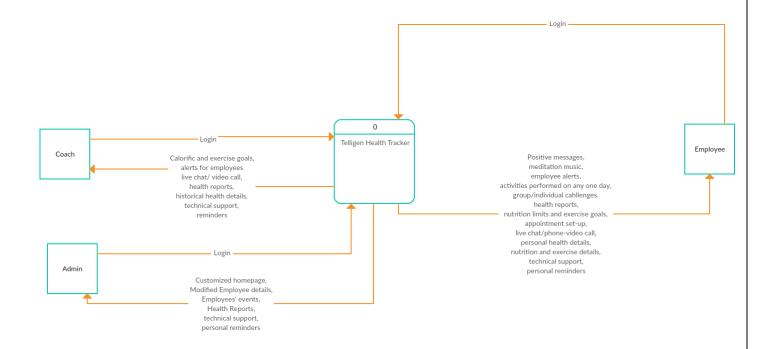
Add/ remove/ edit employee details	This is where the employee details are modified, deleted, or added.	Admin
Add/ edit events for employees	This is where the employees' events are added or edited	Admin
Create /remove /edit challenges for employees	This is where the employee challenges are modified, deleted, or added.	Admin
Set/ edit calorific limits and exercise goals	This is where calorific limits and exercise goals are set and modified.	Coach
Perform video call with employee	This is where video calls are done with employee	Coach
Create/ edit alerts for employees to check health details	This is where alerts for employees are created or modified in order to check their health details	Coach
Accept/ decline appointments	This is where coach can accept or reject employee's appointment	Coach
View upcoming appointments	This is where coach's upcoming appointments are viewed.	Coach

Use Case Narrative

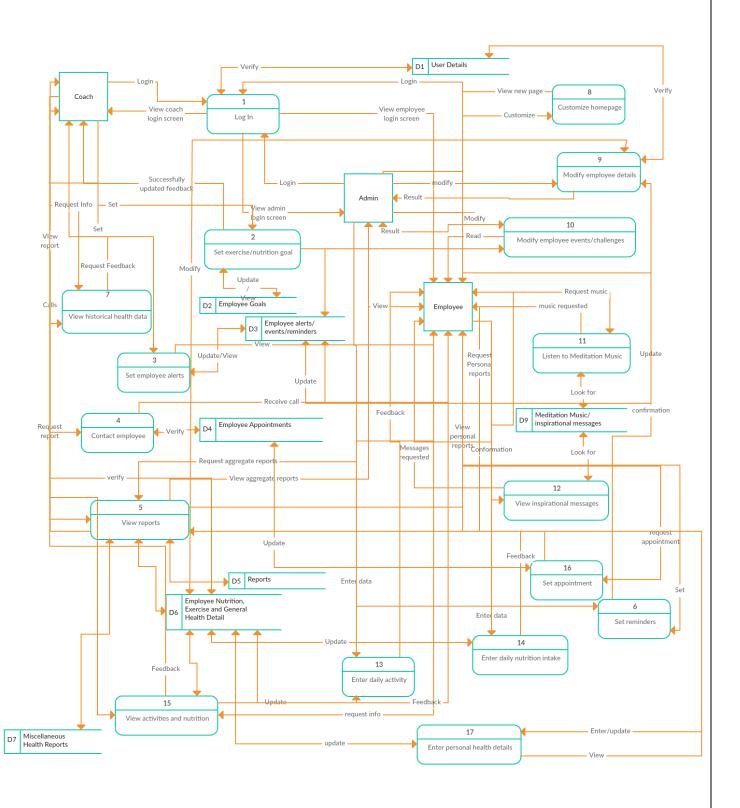
View Reports Use Case			
Name	View Reports		
Actor	Employee/Coach/Admin		
Description	This use case can be accessed by all the actors of the system. Employee executes this use case to view his health reports such as daily activities performed, biological and other health condition reports. Admin will execute this use case to get health summary results of all the employees under him. Using this admin can determine the overall health condition of the employees at the organization. Telligen coach will execute this use case to view the individual reports of employees under him and consult them with health-related solutions.		
Successful Completion	Actor log into the system Actor opens view report Actor finds the needed information for other employees or for himself from the viewed reports to make certain health-related decisions		
Alternative	Actor log into the system Actor is not able to view the report then he should check with the IT support staff for technical support, check his privileges with the admin or check for the report he is trying to view		
Precondition	Precondition Actor wants to view the employee reports to determine health condition and make appropriate decision		
Post-condition	Actor should be logged on and have already made a decision after viewing the health reports		
Assumptions	None		

Data Flow Diagram

DFD-0

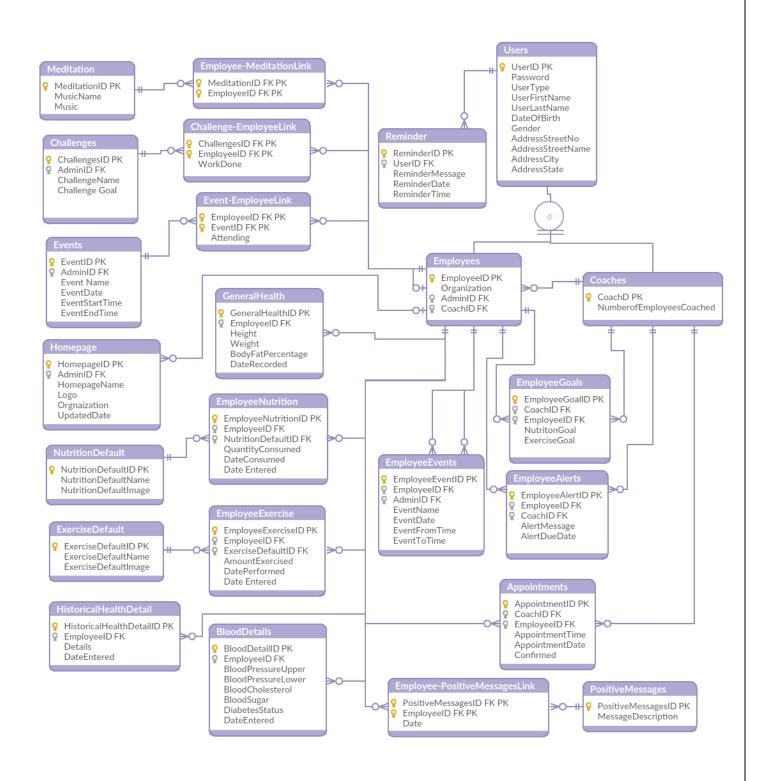


DFD-1



Entity Relationship Diagram

Diagram



Entity Definition Matrix

	Entity	Attributes
1	Meditation	Meditation ID, music name, music
2	Challenges	Challenges ID, Admin ID, Challenge name, challenge goal
3	Events	Event ID, Admin ID, Event Name, Event Date, Event Start Time, Event End Time.
4	Homepage	Homepage ID, Admin ID, Homepage Name, Logo, Organization, Update Date.
5	Employee-Meditation Link	Meditation ID, Employee ID.
6	Challenge-Employee Link.	<u>Challenge ID, Employee ID, Work Done.</u>
7	Event Employee Link	<u>Challenge ID, Employee ID, Attending.</u>
8	General Health	General Health ID, Employee ID, Height, Weight, Body Fat Percentage, Date Recorded.
9	Employee Nutrition	Employee Nutrition ID, Employee ID, Nutrition Default ID, Quantity Consumed, Date Consumed, Date Entered.
10	Employee Exercise	Employee Exercise ID, Employee ID, Exercise Default ID, Amount Exercised, Date Performed, Date Entered.
11	Nutrition Default	Nutrition Default ID, Nutrition Default Name, Nutrition Default Image.
12	Exercise Default	Exercise default ID, Exercise default name, Exercise Default Image.
13	Historical Health Detail	Historical Health Detail ID, Employee ID, Details, Date Entered.
14	Blood Details	Blood Detail ID, Employee ID, Blood Pressure Upper, Blood Pressure Lower, Blood cholesterol, Blood Sugar, Diabetes Status, Date Entered.
15	Users	<u>User ID,</u> Password, User type, User First Name, User Last Name, Date of Birth, Gender, Address Street No., Address Street Name, Address City, Address State.

16	Reminder	Reminder ID, User ID, Reminder Message, Reminder Date, Reminder Time.
17	Employee	Employee ID, Organization, Admin ID, Coach ID.
18	Coaches	Coach ID, Number of Employees Coached.
19	Employee Goals	Employee Goal ID, Coach ID, Employee ID, Nutrition Goal, Exercise Goal.
20	Employee Events	Employee Event ID, Employee ID, Admin ID, Event Name, Event Date, Event From Time, Event To Time.
21	Employee Alerts	Employee Alert ID, Employee ID, Coach ID, Alert Message, Alert Due Date.
22	Appointments	Appointment ID, Coach ID, Employee ID, Appointment Time, Appointment Date, Confirmed.
23	Employee Positive Messages Link	Positive Messages ID, Employee ID, Date.
24	Positive Messages	Positive Messages ID, Message Description.

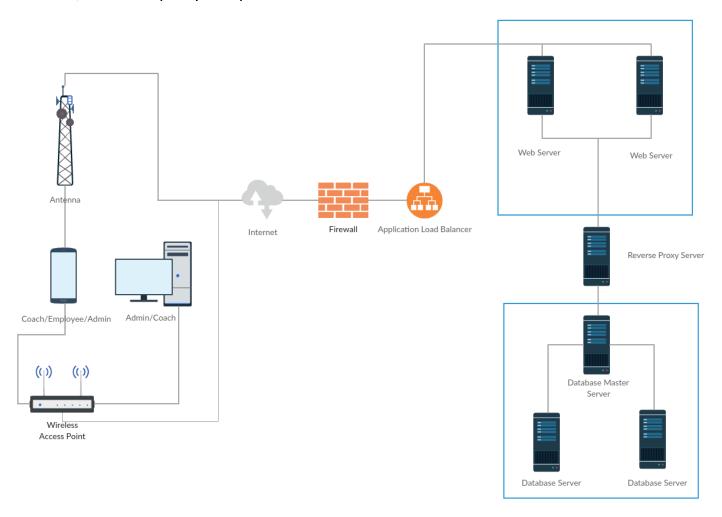
System Architecture

A thin client-server build is planned to be adopted due to its flexibility, ability to allow for object-orientation, general ease of application development level and bulk processing at the server side, which is preferable for a mobile application. We intend to keep the application size light for ease of updating, from the App Store or Play Store, for customers.

From a tier perspective, a three-tier architecture with the User Interface at the webserver (a part of the app server in our case), viewing it at the client (mainly Mobile and sometimes workstation), the data would be stored in the database server and we would have a web/application server (as mentioned earlier) to process requests and return results to the clients. Having a load balancer can help split traffic to web servers. There's a firewall that needs to be passed for entities outside the network to access Telligen's network. An internal firewall also exists to directly access the server from Telligen's internal network. So, an outside entity needing to query or add data into the system would have to pass through two levels of security before it has any access to the servers and hence the data. This helps in many ways:

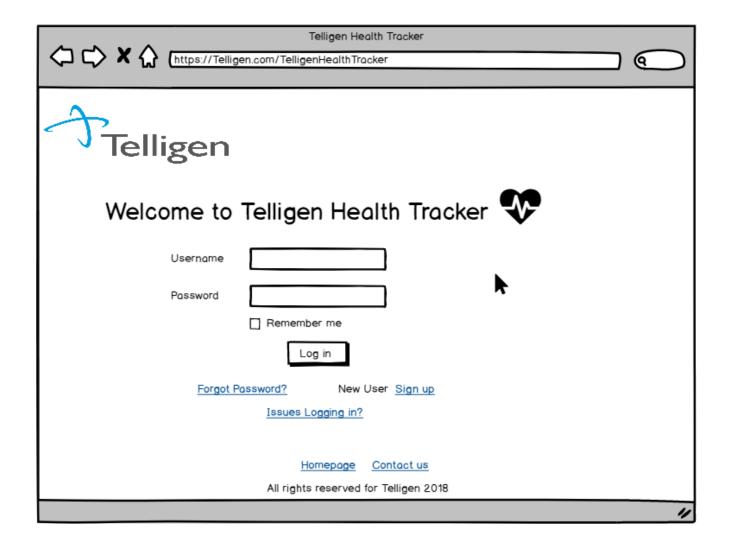
- Having a tiered or layered approach is always robust as it gives dual layer of protection.
- It can deny unauthorized read/write at this level without any need for role verification.

For the database server, it is not advised to have a firewall between the web server and itself. So, a reverse proxy setup could be useful.



User Interface

Login UI



The website UI gives the opportunity for users – employees, coaches and admin users to log into the website. The website it planned to be primarily a visual representation of data entered by employees suing the mobile app.

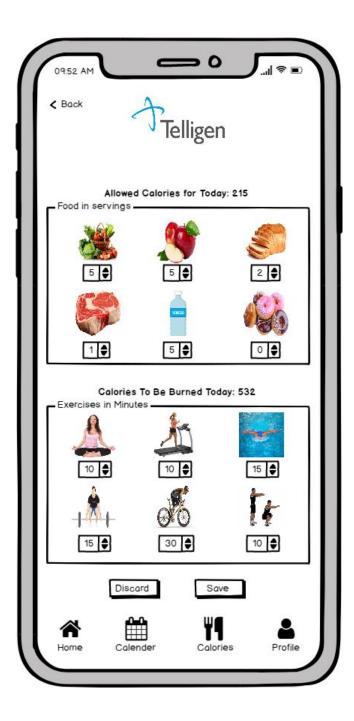
There is place for users to enter their user name and password, and click the "Log In" button, after which they would be transported to the reports they are allowed and wish to see. There is a "Remember Me" option as well, which would remember the user if they authenticate it once initially with their mobile number.

A new user could click the "Sign Up" option to register, which will prompt the respective admin to add the user's details, following which he/she can log in. "Forgot Password" will send the password to the user's registered email. "Issues Logging In" will redirect users to technical support. "Homepage" and "Contact us" will redirect the user to Telligen's own web pages.

The same follows for the mobile interface below:



Data Entry Screen



The above data entry screen on mobile shows the screen in which the employee enters food intake and exercise data.

In the first section, the employee can select a category of food – such as fruit, meat or even water and select servings had for each.

In the second section, the employee can enter the number of minutes a particular activity was performed – yoga, treadmill, swimming, etc. Above each section, is the optimal amount of food intake remaining and exercise needed that day, as recommended by the coach. This data is updated live, as and when the user adds information. On clicking "Save", the user is able to save the data entered, or discard it on clicking "Discard".

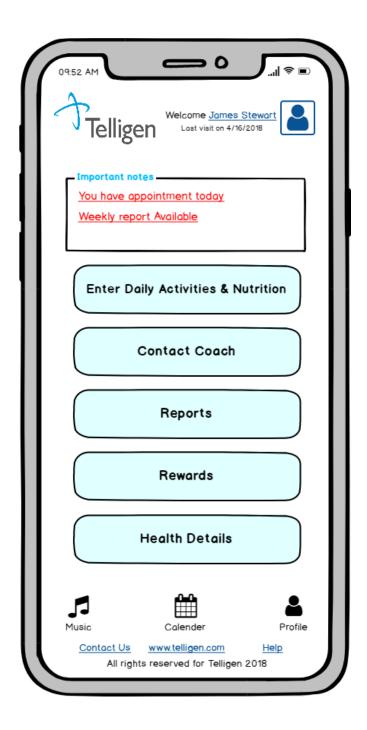
The icons "Home", "Calendar", "Calories" and "Profiles" navigate the user to the main screen, calendar (with all the reminders, alerts and events), gives the user a report on calories taken and navigates to user details page respectively.

Home

The Home page has the user's name and last visited date. In addition, the user is able to view if they have any appointments that day with a Telligen coach and if any weekly report on activity is available.

The user can also choose to navigate to pages to enter their activity and nutrition, reports, view their rewards and general health details.

The user can also opt to contact a coach to schedule an appointment. The Music icon allows the user to listen to Zen meditation music.

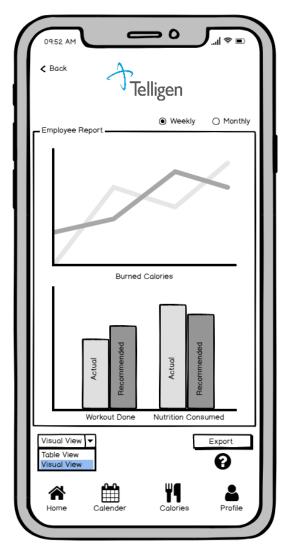


Reports

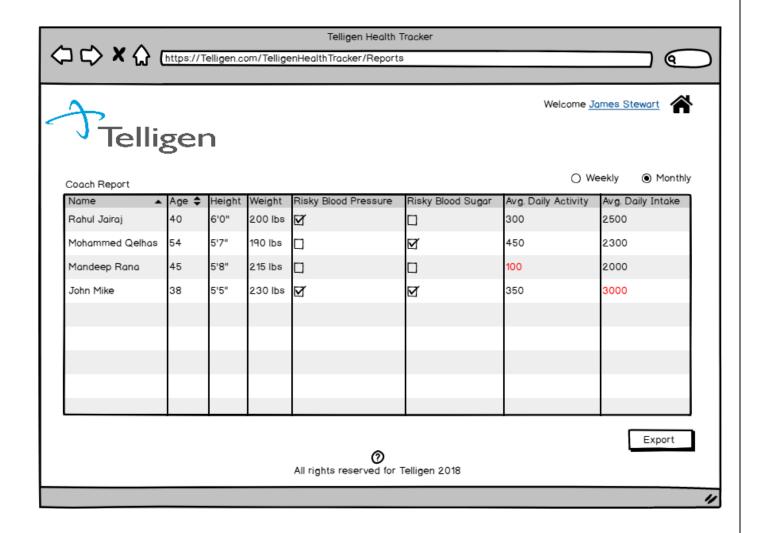
The mobile version of the report shows an example of details as seen by an employee. There is a Weekly and Monthly radio button option, to trigger different reports. The first graph shows the number of calories burned in dark color, against the number of calories that are recommended to be burned in light, for the given time period.

The second graph shows bar charts on the actual work done against recommended amount of work, and the nutrition consumed against the recommended nutrition for the time period selected.

If a tabular view is needed, then that can be selected from the dropdown and exported. Information on what format the export is, how to read the exported file can be got by clicking the "?".



The computer version of the report, but from a coach's perspective is shown as follows:



The Coach's name is shown on the top right, with an option to go to the home page.

The time duration for the duration can be selected, just like before on the radio button – "Weekly" or "Monthly".

The report has data on all employees under the coach, with details such as their name, age, height, weight, whether they have risk in blood pressure or sugar and their average daily activity and intake.

There is also an option to export the table.