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A INTRODUCTION AND SUMMARY

This chapter describes the client and project background, outlines the terms of reference and includes a summary of the remaining chapters in the report.

A.1 The Client
The Irish Rugby Football Union (IRFU) is the governing body for rugby union in Ireland. The IRFU Rugby Department is responsible for the development of all aspects of both the professional and amateur game.

A.2 Project Background
One of the main objectives for the department is to increase the level of participation in rugby across the island of Ireland (Republic of Ireland and Northern Ireland). The department aim to create more opportunities, for both men and women, of all ages and ability, to become involved in the game and provide a quality experience so as to retain current players and members. Achieving this objective will provide a larger depth of players available for selection to regional and provincial squads for elite player development and in turn provide a larger, stronger pool of players available for national squads, with the ultimate goal of improving the ability to compete at a national level.

In alignment with the IRFU strategic Plan (2013-2017) resources are allocated to the four Provincial Rugby Branches to implement a delivery plan. Provincial Rugby Development Managers (RDMs) are responsible for the development of the game in their Branch, supported by a team of Coach Development Officers (CDOs) and Community Rugby Officers (CROs). The CDOs and CROs roles are to work closely with clubs, schools and the local authorities to develop the appropriate infrastructure, support services and training required to with the aim of providing a positive playing for all involved in the game.

To support this management structure it is important that the aforementioned staff have access to accurate, up to date information on a number of on-field and off-field elements for each club under their jurisdiction. These elements are used to determine the health of each club in the country. Monitoring the health of clubs allows managers and officers to identify the problem areas at Club & Community, Regional, and Provincial levels, and in turn aid decisions made on investment at these levels.

Current Process
The current Club Health Check process is a manual internal tool by which each club is graded Red, Amber or Green (RAG) on each element. Information regarding on-field elements is stored in several disparate systems, and information regarding off-field elements is gathered via a manual monthly reports.

On-field Elements
- Referees
- Coaching
- Men Adults Games Played
- Boys Youth Games Played
- Boys Youth Development
- Women Adults Games Played
- Girls Youth Development
- Mini Rugby

Off-field Elements
- Finance
- Child Welfare
- Medical
- Volunteers
- Branch Engagement
- Project Clubhouse
- LSP/Council
- Club/School Link
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- Fitness
- Social Rugby
- Player Development

Officers are required to compile on-field and off-field information in Excel spreadsheets to form Club Health Checks on a monthly basis.

There are several problems with the current approach:

- **Time Consumption**: Gathering and compiling information from several sources into Excel spreadsheets is heavily time consuming for officers.
- **Complexity**: Information required for compiling Health Checks is stored in several disparate systems.
- **Data-Integrity**: Information required from current systems is entered manually to Excel allowing room for human error.
- **Incompleteness**: Several of the Health Check elements have no current means of data capture.
- **Subjectivity**: Several of the Health Check elements are subjective in nature. This leaves room for differing personal opinions when grading Health Check elements.

The aims of this project are:

- To provide a cloud-based reporting application which automatically generates Club Health Checks.
- To cumulate Club Health Checks and provide Regional, Provincial and National Health Checks.
- To integrate the application with a system being developed concurrently which captures data for the off-field Health Check elements.

This will provide the client with a Health Check System allowing a comprehensive assessment of all clubs, regions, and provinces. Cumulating to national level will allow them to assess the state of the amateur game for Irish rugby as a whole. As an added benefit, due to the cloud-based nature of the application, clubs will be able to view their own Health Check, providing accountability to the clubs and giving them with goals to work towards.

### A.3 Terms of Reference

- To investigate the client’s aims through meetings and workshops.
- To research possible solutions
- To develop the current Club Health Check process into an automated web application
- To cumulate Club Health Checks and provide Regional, Provincial and National Health Checks.
- To provide a tiered user access so users can only view Health Checks within their jurisdiction.
- To integrate the application with a data capture application being developed concurrently by Alan O’Neill of Trinity College Dublin, so as to provide the client with a complete online Health Check system.
- To develop extensive technical and user documentation.
Additionally, the exceeds the original terms of reference by:

- Calculating an on-field, off-field, and overall score for club, region and national level.
- Providing a graphing layer for a visual representation of a club, region, province, and the nations Health Check, displaying the change over time.
- Providing the ability for Clubs to view previous Health Checks at certain intervals for comparison purposes.

A.4 Summary

Chapter 2
Chapter 2 discusses the aim of the application, provides a general overview of the application and describes the technical environment.

Chapter 3
Chapter 3 describes the software development model used and the breakdown of work carried out during each phase.

Chapter 4
Chapter 4 outlines recommendations for implementation and project conclusions.
B SYSTEM OVERVIEW

This chapter provides an overview of the application, the technical environment and a description of how the system operates

B.1 System Objectives
The main purpose of the system is two-fold:

• To provide the IRFU Rugby Department officers with complete Health Checks so as to assess the state of club rugby across Ireland.
• To provide clubs with objective goals to work towards.

The Rugby Department managers and officers will use the Health Checks to identify opportunities and areas requiring attention at club, regional, provincial and national level. The calculation of overall Health Check scores will also highlight the regions and clubs on which to focus their efforts, and aid in the decision-making in relation to allocation of resources and investment. The system will also negate the need for the heavily time consuming compilation of Health Checks by officers and allow them to focus their attention on developing more pertinent aspects of the game, for example, developing more effective club interaction.

Club volunteers will have the ability to use the Health Check to highlight areas of their club requiring attention, both on-field and off-field. The Health Check will also be used as a basis for interactions between club volunteers and Rugby Department Officers.

The use of the Health Check system in the aforementioned ways will assist the IRFU Rugby Department in improving the state of club rugby across the country, allowing them to provide a more enjoyable experience all-round and aid in achieving one of the Departments principal objectives; increasing participation in the game.

Specifically, the Health Check Reporting application automates the generation of Club Health Check reports. Previously, officers were required to undertake the mundane task of grading elements of a club manually and compiling Health Check reports in Excel spreadsheets. The reporting application also cumulates Club Health Checks to provide regional, provincial and national reports, which are not currently available to the IRFU in any capacity.

B.2 System Description
The application consists of three main components; the Application Database, the Calculations Layer, and the Front End Layer.

The Application Database
The Application Database is a MySQL Server (version 5.5.38) database. The database consists of 23 tables and requires a further 7 tables from the data capture application. There are 3 components into which these tables can be categorized; the User Layer, the Health Check Elements, and the Past Data Counts.

This section describes these 3 database components in terms of their structure and their use. The ERR Diagram of the database can be found in Appendix D.3.
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User Layer:
The application requires 7 tables from the data capture application for the User Layer component. The table tblClub stores the club names, an ‘id’ for the club and the ‘id’ of the region it is associated with. tblRegion stores the region names, an ‘id’ for the region and the ‘id’ of the province they are associated with. tblProvince stores the province names, a province ‘id’. tblNational stores a single record, assigned the id 1, which is associated with users at a national level. tblUser stores all of a user’s details. tblUserCharacteristic links a user to a specific club ‘id’, region ‘id’ or province ‘id’, or links a user to the national table. Finally, tblUserLevel stores the user access levels’ ‘id’, and a description, whether it is club, region, province, or national characteristic.

The user levels table allows Health Checks to be viewed for only their level and below, and the user characteristic table ensures they can only view the provinces, regions, or club they are associated with.

Health Check Elements:
There are 19 Health Check elements in total. Each element has its own table and stores the club ‘id’ along with the parameters used to calculate the Health Check score for that element.

Past Data Counts:
There are 4 tables for Past Data Counts, one for each level. The club level past data count stores the number of elements scored green, amber and red for on-field, off-field, and over-all. This allows graphs to be populated with the counts for club level over time without needing to re-calculate and grade each element for past data. The region, province, and national tables store the number of clubs scored, green, amber and red, for on-field, off-field and over-all, once again to prevent the need for re-calculating the scores for past data for display on time-series graphs.

Calculations Layer
The calculations layer consists of PHP scripts to call to each Health Check element in the database, pull the data, and calculate the Health Check score and colour for the element. Additional PHP scripts are used to cumulate Club Health Check data for regional, provincial and national Health Checks. Finally, there are PHP scripts to pull past RAG counts for display on the graphing layers. This section provides a brief breakdown of the PHP scripts. Examples of these scripts can be found in Appendix F.

Club Level:
At a club level, there is a separate PHP script for each element. These scripts follow a standard logical flow:

- Connect to the database and pull the most recent data for a Health Check element for a particular club.
- Calculate the Health Check score for that element.
- Run function to obtain the RAG colour based on the score for the element.
- Create HTML within a PHP variable containing the raw data used in calculation for display on the front end.
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At club level there are also 4 additional PHP scripts for each element, which follow the same structure as above, however they pull the data at intervals of 1 month previous, 3 months previous, 6 months previous, and 12 months previous, so past Health Checks can also be viewed for comparison purposes.

A master PHP script is used to cumulate this data and:

- Count the number of on-field elements scored green, amber and red.
- Calculate an on-field score.
- Count the number of off-field elements scored green, amber and red.
- Calculate an off-field score.
- Sum the on-field and off-field element colour counts.
- Calculate an over-all Health Check score for a club.

Regional Level

At a regional level, the PHP script:

- Gets all the club ‘id’s in within a region.
- Loops through the club ‘id’s passing them to the master PHP script for club level.
- Adds clubs element colours, on-field score, off-field score, over-all score, on-field colour, off-field colour and over-all colour to an array.
- Loops through the array to count the number of green, amber and red for each element.
- Calculates the percentage of green, amber and red for each element.
- Determines a colour for each element at regional level.
- Calculates the average on-field, off-field, and overall score for a region.
- Determines a colour for the on-field, off-field and overall score for a region.

Provincial Level

At a provincial level, the PHP script:

- Gets all the region ‘id’s within a province.
- Loops through the regional ‘id’s passing them to the master script for regional level.
- Adds the count of green, amber and red clubs, for each element to an array.
- Adds the regional on-field, off-field, and over-all scores and colours to the array.
- Loops through the array to count the number of green, amber and red for each element.
- Calculates the percentage of green, amber and red for each element.
- Determines a colour for each element at provincial level.
- Calculates the average on-field, off-field and over-all score for a province.
- Determines a colour for the on-field, off-field and over-all score for a province.

National Level

At a national level, the PHP script:

- Gets all the province ‘id’s.
- Loops through the provincial ‘id’s passing them to the master script for the provincial level.
- Adds the count of green, amber, and red clubs, for each element to an array.
- Adds the provincial on-field, off-field, and over-all scores and colours to the array.
• Loops through the array and cumulates the number of green, amber and red for each element of the province level.
• Calculates the percentage of clubs graded green, amber and red for each element.
• Determines a colour for each element.
• Calculates the average on-field, off-field and over-all score for the nation.
• Determines a colour for the on-field, off-field and over-all score for the nation.

Fig 2.2.1 represents the script calculations.

Past Data
The scripts for calculating Health Check data for club, regional, provincial, and national level are run on the first day of each month using a PHP job scheduler. The counts of green, amber and red, for on-field, off-field, and over-all elements are then pushed to the 4 tables in the database for past counts. This prevents the need for re-calculating RAG counts over many months for the graphing layer. If the application were to calculate the counts live each time a report was viewed by a user, the number of calculations required to display a graph across a number of months would greatly reduce the speed of the application.

The Front-End Layer
The Front-End Layer includes a landing page by which users can access two views; the Health Check and the Graphing Layer. These views are available for each of the club, region, province and national data. This section provides a description of these front-end displays.
Health Check View
The Club Health Check displays the current score and colour for each element, and the current on-field, off-field and over-all score and colour. When a user clicks on an element, the element expands to show the raw data used to calculate the score. Each element also has a button, which displays a pop-up box to inform the user of the requirements for classifying the element as green, amber or red. Additionally, at club level, four previous tabs can be viewed to display the Health Check for the previous month, 3 months previous, 6 months previous and 12 months previous.

The Region Health Check displays the percentage breakdown of clubs classified as either green amber or red for each element, and the current on-field, off-field and over-all score and colour for the region. When a user clicks on an element, the element expands to show the number of clubs classified as either green, amber or red for that element. Each element has a button, which displays a pop up box, to inform the user of the requirements for classifying the element as green, amber or red for a regional level. The Region Health Check view also includes a drop-down list populated with the clubs from that region, allowing them to view all the Club Health Checks in the region.

The Province Health Check displays the percentage breakdown of clubs classified as either green, amber or red for each element, and the current, on-field, off-field and over-all score and colour for the region. When a user clicks on an element, they are able to view the breakdown of the number of clubs by province, classified as green, amber and red for that element. A pop-up box with classification descriptions, drop-down populated with provinces, and search bar for viewing Club Health Checks are also included.

Graphing Layer
The Club graphing layer allows users to view the current split of green, amber and red elements, along with the change in the number of elements over time. These views are also available for on-field elements only and off-field elements only.

The Regional, Provincial and National graphing layers display the current split of the number of clubs classified as green, amber and red, and also the change in the number of clubs classified as green, amber and red on a month by month basis. The graphing layer also includes on-field and off-field only views.

Landing Page
Dependent on the user’s level, two buttons are displayed on the landing page. These buttons allow the user to view the Health Check and Graphing layer for the level they are associated with. The user characteristic determines which Health Check is displayed when these buttons are clicked.
Scoring Methods
The existing Health Check process does not score clubs overall, it only classifies elements as green, amber or red. To produce Health Checks for regional, provincial and national level, it was necessary to develop a method of classifying clubs with an overall Health Check colour. During application development, the client also decided that separate scores should be calculated for on-field and off-field elements. This scoring method is detailed below.

There are two points available for each Health Check element. A green element receives the maximum two points, an amber element receives one point, and a red element receives no points. The Health Check score is the total points received as a percentage of the total points on offer. Scores are calculated for both on-field and off-field, and an overall average of these scores produces the Health Check score for a club.

At regional, provincial and national level, Health Check elements are classified as green, amber or red, dependent on the highest frequency of club’s element colours.

B.3 Application Overview Diagram
Figure 2.3.1 outlines the application overview and the flow of information. When the Health Check Reporting application is accessed from within the Integrated Data Capture Application, a landing page is displayed offering users two view options; Health Checks and Reports. For the sake of simplicity Health Check calculations have been removed from the application diagram. These Health Check calculations have been outlined in Fig 2.2.1.

When a user enters the Health Check application, the user level is obtained from the user object. This user level allows the application to decide which Health Check level the user is displayed with. The user characteristic, associating a user with a specific club, region or province is also returned from the user object to decide which health check should be displayed. There is also a user characteristic associating the user with a national level clearance, allowing them to view all available Health Checks. When a user selects either the Health Check view or Report view, the application accesses the database and calculates the Health Check data for their user level and characteristic, before sending a response to the correct template for display on the front-end. As shown in the diagram, users with a higher level of clearance can also access all checks below their level, and all users can switch between views on their level. At national level, the club search function allows users to by-pass provincial and regional views and accesses the Club Health Check or Report directly.
B.4 Technical Environment

The application was developed using six web programming languages; SQL, PHP, Javascript, jQuery, HTML, and CSS.

The database used is a MySQL Server (version 5.5.38) database. This was designed and engineered using MySQL Workbench, an application for creating relational databases in MySQL language.

The database is accessed using Structured Query Language (SQL) with the aid of PHP scripts. PHP is a server-side scripting language, and was also used for...
calculations of Health Check Data. As PHP is a server-side language, this allows the application to run on all of the common web-browsers, and on all machines without affecting the speed of the calculations.

JavaScript and jQuery were used as client-side scripting languages. Client-side scripting refers to operations that take place on the users machine and therefore can affect performance dependent on the quality of the users hardware and software.

Hypertext Markup Language (HTML) and Cascading Style Sheets (CSS) were used for displaying information passed by from the server and styling the application on the client’s browser.

The application was developed using Sublime Text Editor 2, which is a multi-language development environment. This was used as a matter of personal preference over countless alternative development environments.

InVisionapp, a cloud-based prototyping application was used to create initial design prototype, which were shared with the client for review.

Finally, Microsoft Excel was used to create dummy data for testing of the application.

As a pre-requisite to this project a basic working knowledge of each of these technologies was held, however not to the extent that was required for the development of an application of this size and complexity.

All technologies implemented throughout were open-source, and extensive materials were available online for trouble-shooting guidance and de-bugging.
C DESCRIPTION OF WORK DONE
This chapter describes the work carried out over the duration of the project. A Rapid Prototyping Software Development Lifecycle Model (SDLM) was implemented.

Appendix – Rapid Prototyping

Throughout the project duration, meetings and workshops were held with the project owner, Scott Walker (Director of Rugby Development & the Club Game), the project sponsor, Ultan O’Callaghan (Munster DRM), and several other project stakeholders; Chris Webster (Ulster DRM), Eric Elwood (Connacht DRM), Claudia Carr (BearingPoint), Alan O’Neill (Trinity College Dublin), and other IRFU Rugby Department support staff.

The SDLM consists of 6 main phases:
- Requirements Analysis
- Solution Investigation
- Design
- Architecture
- Build
- Testing

In Rapid Prototyping, the design and build phases are carried out iteratively, with considerable client feedback after each iteration. This ensured the application was developed to match the clients needs whilst also providing the opportunity for changes to be made throughout the project duration.

C.1 Requirements Analysis
The requirements analysis phase of the project was to develop an understanding of the client’s core objectives, namely, increasing participation in the game and retaining current players and members. This included gaining an appreciation of the IRFU Rugby Departments Strategic Plan (2013-2017) and the stakeholders of the project. Before meeting with the client, a project briefing was supplied by Claudia Carr of the consultancy firm BearingPoint, who have been providing the IRFU with technical support for the previous 5 years. During this initial briefing, an overview of the current systems in use by the client was delivered.

Appendix – Information collected and stored by the IRFU Rugby Department is stored on several disparate systems:
- Clubhouse System – Player Registration system
- eSports Manager – Game Tracking System
- Microsoft SharePoint – Development Officers Reporting Portal

The Rugby Department required a system with the ability to amalgamate data from each of these systems and produce Health Check reports for each club in Ireland. This phase of the project concluded with the development of a project charter.

C.2 Solution Investigation
The current Health Check process required Rugby Department Officers to undertake the lengthy procedure of manually compiling Health Check reports each month. The drawbacks of this approach are outlined in Chapter 1. The wish of the client was to automate this process. Several solutions were identified:
- Writing Microsoft Excel Macro Scripts to calculate Health Check scores and generate reports
• Integrating a Health Check reporting tool with the Development Officers Reporting Portal in Microsoft SharePoint
• Building a bespoke web-application

Writing Excel Macro Scripts was considered only a partial solution, as although it would reduce the time spent by officers compiling reports, officers would still be required to enter data periodically, and due to the subjective nature of some of the Health Check elements, these elements would be extremely difficult to quantify in such an environment. The client had also expressed the desire for a cloud-based solution inline with their current systems, which Microsoft Excel would not provide. Integrating a Health Check reporting tool with the Development Officers Reporting Portal, being developed by Microsoft SharePoint provider SpanishPoint, was deemed a viable option, however there were several problems with this approach:

• The system was in the early development stages during the project timeframe, causing logistical issues.
• The system required a license fee on a per user basis, meaning as more users were added the higher the cost incurred on the client
• The system did not capture all the information required for the Health Check, and did not solve the subjective nature of certain elements.

Building a bespoke web-application solved the logistical issues of integrating a reporting tool with a system that was not yet in place, and was a much more cost effective approach because of the number of users required to access the application. To solve the final problem of subjective elements, the opportunity arose to integrate the Health Check web-application with a concurrent project by Alan O’Neill, which would provide a data-capture application for the off-field Health Check elements on which no data was available. The two applications would combine to provide the client with a complete, bespoke Health Check system tailored to the client’s exact requirements. The main advantages of this approach are:

• The client can have as many users set up in the system as required at no extra cost
• The subjectivity of the off-field elements could be quantified providing a complete Health Check
• The reporting application could be designed to precise client specifications
• The reporting application could generate live Health Check reports whilst minimizing the administration efforts of Rugby Department staff.
• The Health Check system could be available to any user with internet access on almost any device
• The system could be designed in such a way that it could be built on further as the Health Check process develops.
• Building the application incrementally allows the client to make continuous changes in requirements for the duration of the project, giving a much higher chance of a finished product that satisfies all the clients needs.

This approach is not without its disadvantages:

• Developing a bespoke web-application to specific client requirements is a complex procedure involving several programming languages
• Building incrementally to client requirements leaves room for too much decision-making on the client’s behalf, often causing projects to miss deadlines.
• Integrating bespoke applications is a highly complex task with plenty of room for failure, especially under rigid timeframes
Due to the specific requirements of the client, a bespoke system was the most suitable solution.

There are a wide range of tools and languages which could have been used in the development of such an application. Information required for the Health Check calculations must be stored for the application and so the use of an online database system was required. The Clubhouse and eSports Manager systems currently in use by the Rugby Department, which store data to be used for the Health Check calculations, are built on MySQL servers. Although there are several online database options, to accommodate data transfer from these systems to the Health Check system, it was imperative to keep this consistent, and so the Health Check system is also built on a MySQL server. MySQL is an open-source relational database management system and as such facilitated keeping the cost of the system at a minimum. There are certain other benefits of using open-source software, most notably the extensive documentation and troubleshooting available online. A server-side scripting language was then required to access the database and perform calculations on the server. The main advantage of server-side languages is that because they run on the server-side rather than the client-side, the machine used to view the application will not affect performance. PHP is a popular open-source server-side scripting language widely used in conjunction with MySQL databases, and therefore was the preferred option.

HTML is the standard web markup language for displaying content on web browsers and CSS the accompanying styling language. Both languages have extensive materials available for free online, with a large community of web developers utilizing them.

Finally, a client-side scripting language was required for activities that take place on the client machine without the need to reload the webpage. JavaScript is supported by all major web-browsers and also has an extensive library, jQuery, which simplifies the JavaScript syntax significantly and reduces the amount of code required to deploy JavaScript, albeit at a slight expense in performance.

Bootstrap is a commonly used free, intuitive and powerful framework for developing HTML, CSS and JavaScript and was also employed throughout the application. It assists heavily in responsive web development so web pages can be viewed without obscurity on different platforms such as laptops, tablets and mobile devices.

Flot Charts, an extensive JavaScript plotting library for jQuery was selected for use on the reporting layer, due to its wide range of available charts and appealing aesthetics.

There were a vast range of development environments to choose from when it comes to web development, and as a matter of personal preference, Sublime Text Editor 2 was selected, as it provides syntax highlighting for each of the languages selected and also has a large repository of plugins available including auto-complete features to greatly reduce the time spent typing code. Auto-complete features also aid consistency and reduce typing errors, which can quite easily cause bugs.

C.3 Design

To ensure the application built was to match the client’s needs and expectations, the design phase was completed over several iterations. Front-End mock-ups were designed before meeting with the project sponsor for feedback and approval. These designs were made in draw.io, a comprehensive diagram editor. The designs were
then uploaded to invisonapp, an online prototyping application allowing users to make interactive designs and web-page walkthroughs, which could then be shared to multiple project stakeholders. This allowed faster feedback and a greater response and input and gave the client an idea of what the final application would look like. This phase took place before the architecture phase so as the system architecture could be built to best suit the design of the application. The original prototypes can be found in appendix E.3.

C.4 Architecture
After the design phase and a clearer idea of the system objectives were achieved, the system architecture was defined. This included defining the scope of the application and its functionality, developing a timeline for iterations in the build phase to follow, and deciding on which features would be incorporated in a practical working order.

The scope of the application was defined using the initial terms of reference that were agreed with the client. This ensured that the client’s fundamental requirements were catered for. The application was required to:

- Calculate Health Check scores for on-field Health Check elements
- Receive Health Check scores for off-field Health Check elements from the data capture application
- Grade both on-field and off-field elements as green, amber or red, and calculate overall Health Check scores for a Club
- Calculate and produce Health Checks at regional, provincial, and national level
- Provide a level of security where users could only view clubs, regions, or provinces under their jurisdiction.

The initial project scope was continually re-assessed through client interaction throughout the duration of the build phase so as changes could be made to better match the requirements of the client. The allowance for features to be added throughout the project duration required client expectations to be managed effectively and prevent the project running over the required timeframe.

The final application scope delivered was as follows:

- Calculate the most recent Health Check scores for a club for on-field Health Check elements
- Integrate with the data capture application to receive the most recent off-field Health check element scores
- Classify all Health Check elements as green, amber or red
- Provide a description of how these scores were calculated and classified
- Calculate separate on-field and off-field scores based on the number of elements classified as green, amber or red
- Calculate an overall Health Check score for a club
- Produce past Club Health Checks for comparison purposes
- Cumulate Health Check elements for regional, provincial and national levels
- Calculate average on-field, off-field and overall Health Check scores for regional, provincial and national levels
- Display the Health Checks in an intuitive and user-friendly front-end design for each level
- Provide a reporting layer at club level to
  - Graph the current split of green, amber and red elements, viewable as on-field only, off-field only, and overall elements
  - Display the change in these splits over time
• Provide a reporting layer at regional, provincial and national levels to:
  - Graph the number of clubs classified as green, amber or red for on-field, off-field, and overall elements
  - Display changes in the number of clubs classified as green, amber or red for on-field, off-field and overall, over time

• Provide a level of security where:
  - Club level users can only view Health Check and report for the club they are associated with
  - Region level users can only view the Health Check and report for the region they are associated with and drill-down to view all the Health Checks and reports for clubs within that region
  - Province level users can only view the Health Check and report for the province they are associated with and drill-down to view all Health Checks and reports for regions and clubs within that province
  - National level users can view the National Health Check and report and drill-down to view all Health Checks at province, region and club level.
  - National level users can enter a club into the search bar and go directly to club level without having to click through provincial and regional levels

Additionally, the Health Check views display:

• At national level
  - The breakdown of the number of clubs classified as green, amber and red, for each element, by province.
  - The percentage of clubs classified as green, amber and red for each element

• At provincial level
  - The breakdown of the number of clubs classified as green, amber and red, for each element, by region.
  - The percentage of clubs classified as green, amber and red for each element

• At regional level
  - The breakdown of the number of clubs classified as green, amber and red, for each element within the region
  - The percentage of clubs classified as green, amber and red for each element

• At club level, the raw data and parameters used to calculate and classify elements

C.5 Build
This section outlines the work carried out during the build phase of the development lifecycle. This phase was carried out in increments, or sprints, developing certain aspects and features of the application during each sprint. The build phase took place over 10 weeks; 5 sprints of 2 weeks in duration.

Sprint 1
The initial sprint of the build phase involved creating the front-end templates for the two views available at each level - the Health Check view and the Report view. Templates were developed in HTML and CSS using PHP variables as placeholders where data would be populated later. This approach was crucial as it allowed the front-end templates to be presented to the project owner and the 4 branch RDMs, allowing decisions on what data to be displayed at an early stage of development.
when changes made are easier to handle. During this presentation, the project stakeholders discussed the front-end design at length, before agreeing on the addition of several features that had not been incorporated previously:

- Calculating separate on-field and off-field Health Check scores to formulate the overall Health Check score, rather than an overall score alone
- Adding weightings to the Health Check elements that formulate the on-field and off-field scores
- Additional graphs to display the on-field and off-field element breakdowns

**Sprint 2**
This stage of development involved creating the MySQL database, developing the server-side PHP scripts to pull information from the database, calculate Health Check element scores and classify the elements’ colours. A PHP controller was also developed to facilitate different areas of the application to be accessed on page submissions. This controller provided the backbone for the application development.

Tables were created for each of the Health Check elements to store the club ‘id’, the parameters used for calculation of the Health Check element score, and the date. A table was created to store the number of on-field, off-field, and overall elements classified as green, amber and red for a club along with the date. The reasoning behind this was to prevent the necessity for the application to re-calculate all the element scores across 12 months for graphing purposes. A further 3 tables were created to store similar counts for regional, provincial and national levels. During database creation, heavy interaction was required with Alan O’Neill to ensure consistency across the system and make integration at a later date possible. The user tables on the data application side required additional tables and fields to allow users to be assigned a security level and associate them to a specific, club, region, or province.

A PHP script was written for each element of the Health Check, which accessed the database tables, pulled the required information, calculated the Health Check score for the element, and assigned it a colour. A master PHP script for the Club Health Check then combined the Health Check element scripts to be passed to the templates created during the opening sprint for display on the front-end.

**Sprint 3**
The third sprint involved creating a further two PHP scripts for regional and provincial level calculations. The regional script would loop through the master PHP script for the Club Health Check and cumulate data to be passed to the Health Check template for a region. The provincial script would then loop through the regional script and cumulate the data to be passed to the Provincial Health Check.

**Sprint 4**
The penultimate sprint was comprised of two aspects; cumulating data to a national level and pulling data for display on the reporting layers.

PHP scripts were written to pull data from the past data count tables for each level, to populate the graphs on the reporting layer.

This sprint also included a combined presentation of the Health Check application and Data Capture application to the project owner and multiple project stakeholders. During this presentation some slight changes were requested. The client decided that applying different weights to the Health Check elements for the calculation of on-field and off-field scores might result in clubs focusing on specific aspects of club development, rather than developing the club as a whole. The weightings function
was therefore removed from the application scope. It was also decided that stacked bar charts should replace the time-series graphs displaying the change in green, amber and red elements for a more visual representation of the data.

**Sprint 5**
The final sprint of the build phase included adding navigation logic to the application, integrating the application with the data-capture application and finalizing styling.

Adding navigation logic to the application was an important aspect in making the application user-friendly. Buttons were added to return the previous page and switch between Health Check and Reporting view. Dropdown boxes populated with provinces, regions, and clubs were added to allow users to drill-down from a national level Health Check or Report to provincial level, regional level, and finally to club level. At National level users were required to step through each level to reach a Club Health Check, so an auto-complete club search bar was added to the National level navigation bar.

To integrate the Health Check application with the Reporting application, Alan O’Neill had written PHP scripts to calculate Health Check scores for the off-field elements, which were added to the master PHP script for club level. With these scripts in place, functions were written to classify the element colours.

The final step of development was to finalize certain styling aspects across both applications. This was undertaken co-operatively to ensure consistency across the system.

**C.6 Testing**
The application was unit tested as functionality was added. The system could not be fully tested until integration was complete, as the user levels and characteristics were only available in the Data-Capture application. As there is no data input feature to the Health Check application, dummy data was entered into the database via phpMyAdmin to ensure PHP scripts were accessing the database and calculating scores correctly. Microsoft Excel was used to generate many thousands of dummy data entries for each Health Check element for every club. The Health Check system is yet to be deployed by the client, and as such has only been tested in a development environment. Thorough testing will be required after deployment to ensure all features are functioning correctly.

**C.7 Client Evaluation**
Although the system is yet to be deployed, each client meeting during the development stage elicited a positive response from the project stakeholders.

**C.8 Future Work**
The system was designed with future changes in mind. Great care was taken to prevent building a system which would become obsolete overtime, and facilitate changes to the system with minimal effort from the development team.
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D CONCLUSIONS & RECOMMENDATIONS
This Chapter discusses the project conclusions and recommendations for further work & deployment by the client.

D.1 Conclusions
The final application solves most of the problems of the clients current Health Check process outlined in Chapter 1.2 with some added benefits. Once the system is deployed, Rugby Department staff will no longer be required to compile monthly Health Check reports, greatly reducing the time spent on administration activities and allowing them to focus on other areas such as developing the interactions between Officers and club volunteers. The system also reduces the chance of human error when compiling reports. The Health Check system has the capability of reporting on data from the current systems in place, providing a system that amalgamates data from the disparate systems into one centralized system. The Data-Capture application quantifies the previously subjective elements of the Health Check, meaning the overall system can provide clubs with rigid goals to work towards. The use of open-source software will keep the costs of running the system at a minimum, and the cloud-based nature will allow any user the Rugby Department wishes to allow access to the system, to use it.

One trivial issue with the Health Check application in the development environment is the load times for the national level Health Checks and reports. The national level requires that each clubs element scores be calculated and classified on each page load, meaning many thousands of database calls and calculations taking place on the server. This results in the national level page load times taking a couple of seconds to complete. However, these page loads have only been tested on a local server and once deployed on a dedicated hosting server online, this may not have a noticeable effect on performance. One solution to this problem would be to store the scores for each club when calculated and pull the most recent scores from the database, however this would not provide a ‘live’ Health Check and could result in inaccurate Health Checks.

Third party dependencies for data required to populate the health check has resulted in the inability to deploy the system, although measures have been taken to facilitate deployment once data feeds are available.

Some of the information for the Health Check elements will be stored in systems that are currently being developed, and as such the Health Check system will not be fully operational until these are complete and data transfer into the Health Check system is achieved. However, only a small number of functions would need to be written to for the application to go live. The tables for these elements are already in place, but would need to be edited to match the parameters being received from the other systems.

The size and complexity of the application, coupled with the large number of project stakeholders caused some issue. Building a bespoke application requires many, many hours of planning and coding, which is amplified when also taking into consideration the integration of two applications being developed concurrently. However, this was an exciting opportunity to further develop skills in web-development. The number of project stakeholders caused some confusion and disagreement as to what the final application should encompass, but was an invaluable learning experience in client engagement and expectation management. The experience of undertaking a full software development cycle can only
D.2 Recommendations

There are two major requirements for the Health Check system to go ‘live’:

- The system requires hosting on the World Wide Web
- The system requires data transfer from the current systems in use

The system could be hosted on any number of available web-hosting services that support MySQL databases. This is commonplace for most services and so would be the client’s decision as to where to host. The application could also be hosted on internal servers at the IRFU headquarters, however this would not allow access by all the users targeted.

Data transfer from the existing Clubhouse system and eSports system could be easily facilitated by transferring CSV feeds from these systems to the Health Check system due as both are also based on MySQL servers. The Rugby Department are moving towards live, up-to-date information and so nightly CSV feeds would be preferable. This would require CSV feeds to be cleansed and pushed to the Health Check database tables.

Finally, due to the strict timeframe of the project, the reporting capabilities of the application are limited in comparison to the data that can be stored. Although the application meets the requirements of the client, the Health Check application could be developed further to:

- Allow users to view Club Health Checks by selecting specific dates, rather than the set time periods.
- Allow users to view Region, Province, and National Health Checks from previous dates.
- Allow adaptability of the Health Check elements and the parameters used to calculate scores.
- Allow in-depth reporting on each Health Check element.
# APPENDICES

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<th>APPENDICES</th>
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A ORIGINAL PROJECT OUTLINE

PROJECT 20 Client:

Project: Location: Client Contact: Dept. Contact:

Client Background:

Irish Rugby Football Union Rugby Department KPI Reporting – Rugby Development Officers Lansdowne Rd. Dublin 4 Scott Walker, Director of Rugby Development, Andrew Montgomery, BearingPoint Aideen Keaney

The Irish Rugby Football Union (IRFU) is the governing body for Rugby in Ireland. The IRFU Rugby Department is responsible for the development of all aspects of the game at professional and club level. A key objective for the department is to increase the level of participation in rugby. This will be through creating opportunities for men and women of all ages and ability, to become involved in the game, and retaining players/members through providing a quality experience. This in turn increases the depth of players available for selection to regional and provincial squads for elite player development.

BearingPoint is an independent management and technology consultancy managed and owned by its 120 Partners located in 14 countries across Europe. Employing over 200 technology and management consultants in Dublin, and 3500 internationally, they bring extensive capability and practical experience in implementing business solutions for their clients across the public, commercial and financial services sectors.

BearingPoint has been providing a range of technology and project management advisory services to the IRFU for the last four years.”

See details after Project No 20 for further information on the IRFU Strategy.

Client Requirement:

In line with the IRFU Strategic Plan (2013-2017), there is an
increased need to review the outputs of specific programmes and activities; at provincial level these outputs are viewed collectively, against the fulfilment of strategic objectives; and at national level, the emphasis is on the achievement of broader outcomes across the whole of Irish rugby.

In time, however, it is anticipated that the review process will be augmented by a consideration of the wider geographical and demographic profile of each region, so that there can be an assessment of the fulfilment of “rugby potential” and the allocation of resources (staff and finance). Therefore KPI reporting is critical to support the management of the Rugby Department and allow the IRFU to proactively react to the needs clubs, schools and members within the environment in which the game and player development occurs.

The IRFU makes a significant investment in the development of the game at all levels. Analysis of KPI reports will provide additional insights into the effectiveness of that investment and the overall outcome (ideally more people involved in the game).

The IRFU would like to cross reference the outputs of the Rugby Department (i.e. courses and seminars run, game organised, club and game development activities) with the outcomes in relation to player numbers and participation in the game (volunteers, referees, club members) and development of a pool of high potential players.

Information will be captured from a variety of sources including:

- Membership database (SQLServer)
- Event Management Systems for coaching courses and seminars (SQL Server)
- Various spreadsheets maintained at IRFU and Branch level
- (Potential output from proposed project 2) The project will provide students with an opportunity to apply skills across the
full system lifecycle from initial design through to implementation. A key focus of the project is to extract business value from data sources. Students will be required to focus on the needs of the client firstly, and develop the technical solution to meet those needs. Realising business benefits will be a key measure of success. **What is involved for the student?**

- Familiarising themselves with the IRFU data model, core Clubhouse dataset and other data sources
- Map key performance measures to data to identify where automated dashboard reports can be used to support KPI analysis and reporting
- Facilitation of report design workshops with the IRFU and Branch staff
- Preparation of functional/business requirements for dashboard reports
- Design and develop agreed reports (including testing and supporting user acceptance testing by end users)
- Development of usage guidelines for end users of reports
B INTERIM REPORT

Management Science and Information Systems Studies Interim Report

Project: Rugby Department KPI Reporting – Development Officers

Client: Ireland Rugby Football Union

Student: Scott Burrell

Supervisor: Mary Sharp

Review of Background

The IRFU makes significant investment in the development of the game at all levels. It is important for the IRFU to see where their investment is effective, and to determine areas of priority. With the increase in technology and data available to the IRFU, live reporting on this data will further aid actions taken and the allocation of resources with the ultimate aim of increasing participation in the sport.

Work to Date

I have attended an initial briefing with BearingPoint who have been working with the IRFU for the past 4 years on technology solutions. This meeting included an overview of the current systems in use and the aim is as a whole. I have familiarized myself with the IRFU’s strategic plan and attended several requirements gathering meetings with the IRFU. I have also attended two Development Officer Workshops with the IRFU, BearingPoint and technology company SpanishPoint, who are currently making software from which some of the data included in the KPI Reports will be pulled. I have drawn up an initial project charter, which includes the scope of the project and the timeline, which is to be signed off by the project sponsor on the 8th of December.

Initial Terms of Reference

To develop a cloud based KPI Reporting Tool for use by Rugby Development Officer’s, to allow them to identify priority areas by:

- Developing the current manual RAG health check in place into an automated web application
- Pulling data from the different systems already in place
- Changing some of their current subjective scoring methods to metrics that can be quantified

This has been expanded upon to allow reporting at National, Province, Region and Club level, with various aspects of drill-down.

Further Work

The project has been divided into 4 phases. The preliminary dates for completion of each phase are also included
IRFU Health Check System – Reporting Application
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- Plan – Requirements Gathering and Scope Definition – 12th Dec
- Design – Full Design based on Requirements – 9th Jan
- Build – Iterative Sprints with regular IRFU check ups – 27th Feb
- Deploy – User Testing and Deployment – 13th March

Scott Burrell

10815759
## Project Charter - Rugby Development Officers KPI Reporting

### Scott Burrell

### Opportunity Statement

The IRFU makes significant investment in the development of the game at all levels. It is important for the IRFU to see where their investment is effective, and to determine areas of priority. With the increase in technology and data available to the IRFU, live reporting on this data will further aid actions taken and the allocation of resources with the ultimate aim of increasing participation in the sport.

### Objectives - Goal Statement

At present, the IRFU use a RAG rating system referred to as the Club Health Check to aid with decisions on action and allocation of resources. The Club Health Check is currently an internal tool, however, allowing club’s to view their own Health Check will help improve the interactions between Branch and Club.

The objective is to move the Health Check to an online platform where users can view the current health of a club, provide staff with up-to-date live Health Score, and to identify any areas in which a Club is struggling. This will also provide accountability to the club, giving them goals to work towards. At Branch and National level reporting on the health check will provide better insights to make informed decisions on where resources should be allocated and what actions can be taken to improve the health of rugby across Ireland.

### Scope

Build a cloud-based application that:

- Calculates Health Check scores for a variety of parameters for each club.
- Allows Health Check Statistics and Reports to be viewed at club, regional, provincial and national level.
- Has user restrictions in place - user’s can only view the clubs/regions/province they are involved with.
- Allows users to compare current with past reports.
- Has the ability to import data from current IRFU systems
- Integrates with Data Capture Application (concurrent project – Alan O’Neill)

### Supplement with User Documentation

### Project Sponsor

Ultan O’Callaghan
## Resources

<table>
<thead>
<tr>
<th>IRFU</th>
<th>BearingPoint</th>
<th>Alan O’Neill (MSISS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Initial Documentation (Background, Project Drivers, IT Over Structure)</td>
<td>• Initial Documentation</td>
<td>• Providing some input data for health check</td>
</tr>
<tr>
<td>• Functional Requirements Breakdown</td>
<td>• Technical Support</td>
<td></td>
</tr>
<tr>
<td>• Health Check</td>
<td>• Data Sources Overview</td>
<td></td>
</tr>
</tbody>
</table>

## Timelines

1. 12th December – IRFU meeting – End of Plan Phase
2. 15th December – Design/Build/Deploy iterations
3. 9th January – IRFU & BearingPoint meeting – Design Check-Point
4. 13th March – Deploy
5. 27th March – Project Report
Click on Health Check Reports to enter Health Check application

This is an example landing page – User level: National
Click on either View Health Check or View Report
Select Province from dropdown to view province Health Check
Example province Health Check

<table>
<thead>
<tr>
<th>Health Check Score</th>
<th>17%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>On Field</strong></td>
<td></td>
</tr>
<tr>
<td>Referees</td>
<td>33%</td>
</tr>
<tr>
<td>Coaching Youth/Adults</td>
<td>2%  18%  58%</td>
</tr>
<tr>
<td>Men Adult Games Played</td>
<td>0%  12%  67%</td>
</tr>
<tr>
<td>Boys Youth Games Played</td>
<td>9%  9%  4%</td>
</tr>
<tr>
<td>Boys Youth Development</td>
<td>4%  74%  16%</td>
</tr>
<tr>
<td>Wommes Adult Games Played</td>
<td>3%  0%  51%</td>
</tr>
<tr>
<td>Girls Youth Development</td>
<td>43%  12%  4%</td>
</tr>
<tr>
<td><strong>Off Field</strong></td>
<td></td>
</tr>
<tr>
<td>Finance</td>
<td>0%</td>
</tr>
<tr>
<td>Child Welfare</td>
<td>0%</td>
</tr>
<tr>
<td>Medical</td>
<td>0%</td>
</tr>
<tr>
<td>Volunteers</td>
<td>0%</td>
</tr>
<tr>
<td>Branch Engagement</td>
<td>0%</td>
</tr>
<tr>
<td>Project Clubhouse</td>
<td>0%</td>
</tr>
<tr>
<td>LSP/Council</td>
<td>0%</td>
</tr>
<tr>
<td>Club/School Link</td>
<td>0%</td>
</tr>
</tbody>
</table>

View Province Report

Back to National Health Check

Health Check Home
IRFU Health Check System – Reporting Application
March 2015

Click on Element title to view breakdown
Click on Scores to view explanation

Select Region from dropdown
Region View

North East Leinster - Health Check

Health Check Score

- On Field: 31%
- Off Field: 0%
- Referees: Green 0%, Amber 0%, Red 0%
- Coaching Youth/Adults: Green 0%, Amber 0%, Red 0%
- Men Adults Games Played: Green 0%, Amber 0%, Red 0%
- Boys Youth Games Played: Green 0%, Amber 0%, Red 0%
- Boys Youth Development: Green 0%, Amber 0%, Red 0%
- Women's Adults Games Played: Green 0%, Amber 0%, Red 0%
- Girls Youth Development: Green 27%, Amber 0%, Red 0%
- Mini Rugby: Green 46%, Amber 16%, Red 5%
- Fitness: Green 56%, Amber 21%, Red 0%
- Social Rugby: Green 48%, Amber 21%, Red 0%
- Player Development: Green 5%, Amber 0%, Red 0%

Region View

View Region Report

Back to Province Health Check

Health Check Home
Click on element titles to view breakdown
Click on club to view Health Check for club level

Health Check view for club level

Click on tabs to see previous health checks
Click on question mark to view classification
Click on Element titles for breakdown

<table>
<thead>
<tr>
<th>Element</th>
<th>On Field</th>
<th>Off Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balbriggan Health Check</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Check Score</td>
<td>59%</td>
<td>37%</td>
</tr>
<tr>
<td>This is an average of the On-field and Off-field scores.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On Field</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 points are on offer for each element:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green: 2 Points</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amber: 1 Point</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red: 0 Points</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The score is a percentage of the total points on offer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coaching Youth/Adults</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active Referees</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Active Men’s Teams</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Mentoring Adults Played</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixtures Complete</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Fixtures Incomplete</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Boys Youth Games Played</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys Youth Development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identified Youth Co-ordinator</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Number of Age Grade Groups</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Percentage of Fixtures Complete</td>
<td>100 %</td>
<td></td>
</tr>
<tr>
<td>Women’s Adult Games Played</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls Youth Development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mini Rugby</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fitness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Rugby</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Player Development</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Finance: 93%
Child Welfare: 53%
Crisis Welfare Officer?: Yes
Crisis Welfare Policy?: No
Medical: 52%
Volunteers: 61%
Branch Engagement: 57%
Project Clubhouses: 73%
LSP/Council: 65%
Club/School Link: 67%

View Club Report
Back to Region Health Check
Health Check Home
National level Report
Type club into search bar to go directly to club

Club Report Page
Click on tabs to view on-field and off-field reports
E DESIGN DOCUMENTATION

E.1 Design Prototype

This is the initial prototype developed during the design phase

National Level Report:

National Level Health Check
IRFU Health Check System – Reporting Application
March 2015

Club Level Health check

Example dropdown
E.2 System ERR Diagram
E.3  Software Development Model – Rapid Prototyping

A prototype is an initial version of a system used to demonstrate concepts and try out design options. A prototype can be used in:

- The requirements engineering process to help with requirements elicitation and validation.
- In design processes to explore options and develop a User Interface Design.
- In the testing process to run back-to-back tests.

Benefits of Prototyping

- Improved system usability.
- A closer match to users’ real needs.
- Improved design quality.
F SAMPLE SOURCE CODE

Get most recent health check element from database example

```php
<?php

// GET CONNECTION

require_once DOCUMENT_ROOT . '/irfu/report/report/api/ includes/config.php';
include DOCUMENT_ROOT . '/includes/connect.php';

// GET LATEST RAW DATA

$sql = "SELECT * FROM tblReferences WHERE tblClub_Club_id = $Club_id AND references_date = (SELECT MAX(references_date) FROM tblReferences WHERE tblClub_Club_id = $Club_id);

try {
    $stmt = $pdo->prepare($sql);
    $stmt->bindparam("$Club_id", $Club_id, PDO::PARAM_INT);
    $stmt->execute();
}
catch (PDOException $e) {
    require DOCUMENT_ROOT . '/error-temp.php';
    exit();
}

$list = array();
//echo "working";
while ($row = $stmt->fetch()) {
    //echo "row: " . $row['reference_action_number'] . " $row['Section|Main|Team']";
    
}
// Do calculations

if ($refRAGScore > 180) {
    $refRAGColor = "green";
    $RAGGreenCount ++;
} else if ($refRAGScore > 60 and $refRAGScore < 80) {
    $refRAGColor = "amber";
    $RAGAmberCount ++;
} else if ($refRAGScore < 60) {
    $refRAGColor = "red";
    $RAGRedCount ++;
}
?>
```

Calculate Health Check Colour example
Front-end element example
On-field and Off-field Score example

```python
for($onfieldi = 0; $onfieldi < $onfield_length; $onfieldi++){
    $color = $onfield[$onfieldi];
    if($color == "green"){
        $onfield_green_count++;
    } else if ($color == "amber"){
        $onfield_amber_count++;
    } else if ($color == "red"){
        $onfield_red_count++;
    }
}

/onfield_score = (((($onfield_green_count*2) + $onfield_amber_count))/$onfield_length)*100;

for($offfieldi = 0; $offfieldi < $offfield_length; $offfieldi++){
    $color = $offfield[$offfieldi];
    if($color == "green"){
        $offfield_green_count++;
    } else if ($color == "amber"){
        $offfield_amber_count++;
    } else if ($color == "red"){
        $offfield_red_count++;
    }
}

/offfield_score = (((($offfield_green_count*2) + $offfield_amber_count))/$offfield_length)*100;

$club_score = (((onfield_score + $offfield_score)/2);

//apply colors
if($onfield_score > 80){
    $onfieldRAGColor = "green";
} else if($onfield_score > 60 and $onfield_score <= 80){
    $onfieldRAGColor = "amber";
} else if($onfield_score > 0 and $onfield_score <= 60){
    $onfieldRAGColor = "red";
}

if($offfield_score > 80){
    $offfieldRAGColor = "green";
} else if($offfield_score > 60 and $offfield_score <= 80){
    $offfieldRAGColor = "amber";
} else if($offfield_score <= 60){
    $offfieldRAGColor = "red";
}

if($club_score > 80){
    $scoreRAGColor = "green";
} else if($club_score > 60 and $club_score <= 80){
    $scoreRAGColor = "amber";
} else if($club_score <= 60){
    $scoreRAGColor = "red";
}
```