

CM10313

Technology and Health:
Using personal informatics to promote healthier relationships with sleep and alcohol

Group 27

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Title and Abstract

Technology and Health: Using personal informatics to promote healthier relationships with sleep and alcohol

Sophia Shepherd, Niccolò Sottile, Robert Szuba, Katie Taylor, Samuel Thomson, Amber Tong, Elliot Whaley

The use of personal informatic systems to track various aspects of peoples' lives has been shown through various studies to promote a healthier lifestyle for the users; however, these systems could be used more effectively to promote healthy sleep habits and relationships with alcohol. The development of our PI system was conducted using a scrum agile development methodology containing three sprints of around 2 weeks each. The first sprint focused on research and data collection: interviews with potential users were conducted; the relationship of alcohol and sleep was thoroughly researched, and we collected information on how PI systems can be used to effectively influence the user. This research allowed for a criterion for the system which provided a clear vision of how the system should look and behave. The design phase was followed by development and testing of the system; utilising peer programming to produce pieces of the system individually which were then combined and refined to create the final system. The researched features of successful PIs and the stated user requirements were a high priority in production such as data presentation, data correlation and personal goals for the users. These features allowed us to produce an in-depth system which promotes lifestyle changes that result in the user being healthier and more aware of their alcohol consumption and sleep patterns. To further evolve this system we could demonstrate more complex relationships between alcohol and sleep.

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Introduction

Description of problem area (Personal Informatics):

“Personal informatics is a class of tools that help people collect personally relevant information for the purpose of self-reflection and self-monitoring” (Li, n.d.). With the advancement of technology, personal informatics is becoming more prevalent in society and commonplace in people’s lives with many mobile and website applications offering an extensive array of data collection methods and distribution displays. Applications such as Samsung/Apple Health have made personal informatics accessible for many people and provides the ability to collect and display data ranging from hours of sleep to daily calorie intake. However, disparate data such as wages and spending can also be easily tracked. Personal Informatic systems allow self-insight into the user’s habits and lifestyle. This perspective can be beneficial in changing and improving one’s lifestyle to become healthier and achieve self-administered goals.

What can make a PI software system effective for its users:

Li, Dey and Forlizzi (2010) discusses some issues/barriers that may be encountered by PI systems, and demonstrates solutions that will in turn create a more effective system for its users. The paper describes how the systems “should be designed holistically”, with holistically, in this case, meaning taking the whole problem and system into consideration when designing and developing it. Prioritising innovation and change makes the system more effective for its users as it best suits the user’s needs. Therefore, we are taking an agile approach to the development process. It is also stated that in the data collection stage, users may encounter issues when they “lacked time, lacked motivation, or did not remember to collect information”. As a result of this, PI software systems can be made more effective for its users by using a more system-driven approach to reduce the time and motivation demand on the user. However, this should be used in balance with a user-driven approach as this allows the user to feel they have more control over their data. In order to improve the effectiveness of a PI software system and reduce the number of users stopping using the system, it is important that the system is “flexible” and can “easily change what kind of data they collect dependent on their needs”. Rapp, Marcengo, Buriano, Ruffo, Lai and Cena (2018) identifies requirements that ensure new users stay engaged with the PI systems:

1. “Promote the integration of different sources of data”
2. “Support users in remembering their data”
3. “Support users in identifying with their data”
4. “Offer different views on data”
5. “Highlight data correlations”

For our PI system, we will be primarily focusing on requirements 1, 4 and 5. Our system will integrate 2 types of data (alcohol intake and amount of sleep), and will display the data in different forms, including graphs, as well as the correlation between the two. This ensures we engage the users more and encourage them to continue using our PI system.

The study by Fritz et al. (2014) mentions certain features that were implemented with the intention to keep the users engaged with the PI system over a long period (3-54 months).

The approaches taken to improve user engagement were centralised around creating motivation, including providing “numerical feedback”, “explicit rewards or goals” and “ways of sharing data”. These approaches encouraged the users to make small adjustments to their daily routines which consequently promoted positive long-term behavioural changes. The PI system should aim to reflect this effect as it increases user engagement and satisfaction.

Jones and Kelly (2016) determined what made PI systems interesting to potential users. The study found the most important factors to be surprisingness, utility, and positive valence. In particular, the relationships that presented contradictions of existing knowledge increased user interest. This translates into the analysis of sleep and alcohol consumption as we may find surprising phenomena. For example, alcohol may allow you to fall asleep more quickly. Actual utility invites the user to use the system more often and with higher consistency. A positive valence, where a positive trend is discovered, contributes to a more attractive PI system. For instance, if moderate alcohol consumption overall has a positive effect on sleep.

Statement of the main idea behind your particular PI software system:

Ebrahim et al. (2013) recognised “alcohol causes a reduction in sleep onset latency … and an increase in sleep disruption in the second half of sleep”. The main idea behind our PI system is to bring awareness the effects alcohol can have on sleep, allowing users to “take action on their newfound knowledge”(Li et al., 2012)

We sent out a questionnaire to our target audience, students, in order to collect opinion data. It received almost 100 responses, and the following data indicates that the amount as well as the frequency of alcohol are related to inconsistent sleeping patterns in students:

- 70% of students have inconsistent sleep - suggests this is common with students
- 51% of students drink alcohol weekly or more
- 16% of students have very inconsistent sleep - the probability of students having very inconsistent sleep given that they drink weekly or more is 29%
- The probability of students having inconsistent sleep given that they drink at least once a week to the point of being unable to walk in a straight line is 92%

Students consistency of sleep compared to relative alcohol consumption

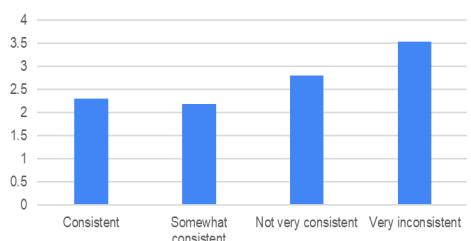


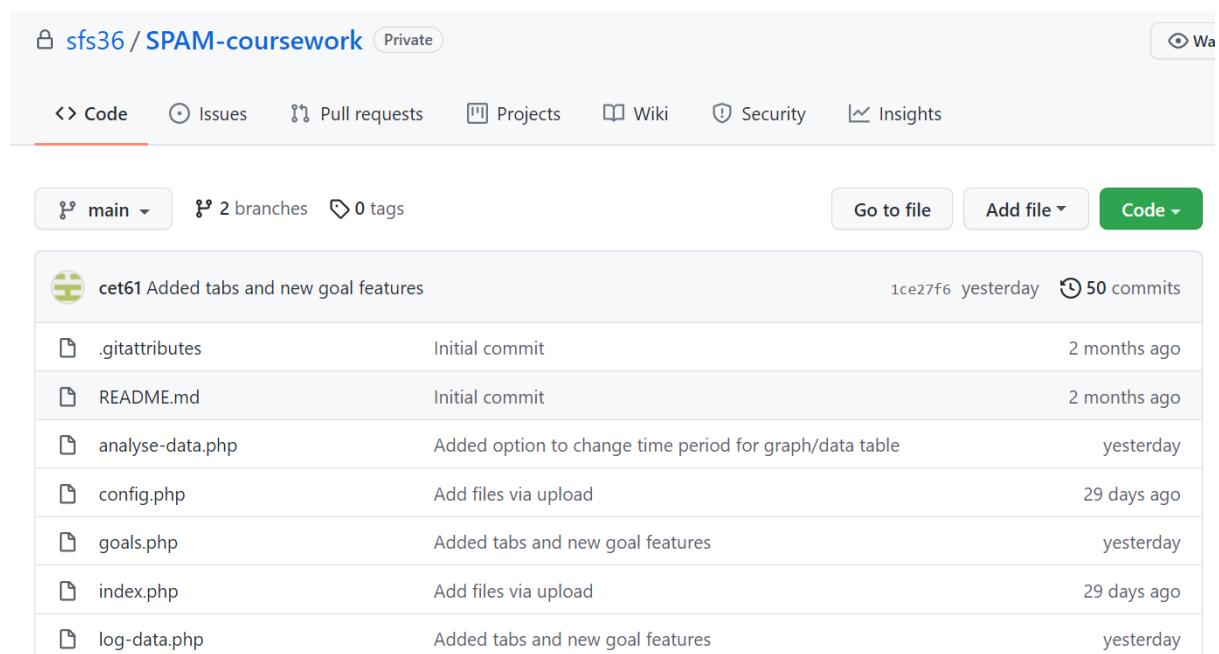
Figure 1

To aid the design process, interviews were conducted to grasp a concept of what stakeholders would want to see present in the PI system and adapt the current design to fit these requirements. The questions discussed the data specifically such as types of data entered, how data was entered and how data was to be displayed and linked. In addition, timeframes for data comparison, motivation, goals, and the user interface were also brought up to improve the user experience. The answers led us to design aspects on the PI in specific ways. For example, the interviewed individuals requested that data was presented as graphs and percentages and that the user interface was clear and simple (prioritising ease of use over complexity). These design requests helped to guide the development process and gave a clear concept of the requirements that the PI system should meet in a more detailed way than what the questionnaire could provide.

Agile Software Process Planning and Management

Our group carried out our project as an Agile process by using the Scrum framework. Throughout development, we followed the key principles of agile philosophy. Early on, we involved the target users early on through interviews and surveys and using the results to aid the design process. We then incrementally delivered our system in three scrum sprints, using Trello to plan and track each sprints' progress by creating backlogs for each of them. The tasks for each sprint backlog were pulled from the product backlog, which contained any features that were not yet implemented. Trello allows us to assign each member in the group multiple tasks; at the beginning of each sprint, each member selects which tasks they will complete in the sprint, balancing out the workload. We decided every Sunday to send a progress update report on Discord, in order to inform other members of the group with how we're getting on with the tasks. We also conducted two meetings per week to track sprint progress, and carry out any pair programming tasks, which we took minutes for.

For our first sprint, we initially decided to use Flask, a framework written in Python, to help develop our web application. This was because most of the group was familiar with using Python. A few members were given tasks dedicated to figuring out how we could connect the backend data to the front end using Flask. However, in one of our Scrum meetings during the sprint, we discovered that the Python interpreters for Flask would frequently give errors that would stop the web server from launching. Therefore, our group decided to switch from using the Flask framework to using PHP to develop our website since a member was already familiar with the server scripting language. In addition, we became familiar with git and set up github accounts in order to reap the benefits of version control and team working. Below is a screenshot of our GitHub repository. On this screenshot you can see how team members have all been able to upload and view code remotely and utilise branches in order to help coordinate our team.



The screenshot shows a GitHub repository page for 'sfs36 / SPAM-coursework'. The 'Code' tab is selected, showing a list of commits. The main commit is by 'cet61' adding tabs and new goal features, with 50 commits. Below it are commits for '.gitattributes', 'README.md', 'analyse-data.php', 'config.php', 'goals.php', 'index.php', and 'log-data.php'. The commits are dated from yesterday to 2 months ago.

File	Description	Date
.gitattributes	Initial commit	2 months ago
README.md	Initial commit	2 months ago
analyse-data.php	Added option to change time period for graph/data table	yesterday
config.php	Add files via upload	29 days ago
goals.php	Added tabs and new goal features	yesterday
index.php	Add files via upload	29 days ago
log-data.php	Added tabs and new goal features	yesterday

The database was designed and created on PHPMyAdmin, and SQL insert statements for data were written. Based on the research we conducted on the number of units popular alcoholic drinks contain, we used the data to calculate how many units per ml each drink contains. Following this, we included the alcohol data in the database, and created an algorithm to convert the alcohol type and consumption volume to units. Data validation checks were also created for data entry. Simultaneously, we completed designing and setting up the website. The login/register pages were created using HTML/CSS, PHP and MYSQL. Some HTML pages with forms (used to collect sleep and alcohol data) were created alongside a CSS file, which is used to customise the external appearance of the website. Bootstrap is a CSS framework that supports the device interoperability and has some prebuilt functions that were used. At the end of sprint one, we still had to connect the rest of the database with the website.

Our second sprint consisted of two weeks and focused on combining the website and the database together, as well as designing the website. We decided to have a larger sprint backlog this sprint to test our limits of workload, and to prioritise the few tasks we did not complete in the first sprint. One of these tasks was parameterising the SQL queries to ensure users could not input SQL statements directly into the database. This was carried out during a pair programming session, which we did throughout the sprint to implement different elements of the website. The additional tasks completed in pair programming sessions were adding dropdown options from the database onto the website, adding a volume of alcohol input box to the log data page, creating the signup and login pages with functionality and censoring any password entered by the user with asterisks. As well as this, a checkbox was created for the user to indicate whether their weight is in pounds or kilograms. The database was also altered to include a primary key in all of the tables, allowing any entry into the database to be indexed uniquely. With the creation of the signup and login pages, the user needed to be able to change any personal information linked to their account, and so the profile page was created which uses MYSQL to edit data in the database. The final coding element was implementing validation checks for the log-data page, which was done in PHP. These completed tasks all meant the database is now largely connected to the website using PHP.

The sprint also included several designing elements, firstly with the creation of a website design diagram, which detailed the UI of the website. We then designed the log-data and analyse data page in more detail, as well as designing and choosing the graphs that would display the data to the user on the analyse page; we have chosen a combination of line graphs and bar charts to display this data. One task that we still have not managed to complete from the first sprint is carrying out the testing plan on the website, and it was not in a finished state to test. This will, however, be a priority task in our third and final sprint, alongside two other tasks remaining in our sprint backlog highlighted in our sprint review: making the alcohol database functional with the website and validating date of birth and weight inputs on the sign-up page.

During our third and final sprint, which consisted of three weeks, consisted of implementing the goals and analyse data and pages to make the website entirely functional and display all of the data collected about the user. After designing the goals page, a page to allow users to see any current, or previous goals, as well as change their goal, we began developing it. The first box on the page shows the user a random fun fact related to sleep or alcohol each time they access the goals page. This was implemented by adding 30 different researched facts

into the database using an SQL insert statement, and then coding the page to display one sleep and one alcohol fact using PHP. PHP and SQL were also used to store goals input by the user into the database, which could be used on the analyse data page. We also displayed a table at the bottom of the goals page to show the user any previous goals they have set, completing the goals page.

The analyse data page consists of three tabs (sleep, alcohol and comparison), each with a graph displaying the data input by the user, and development began with setting up these three tabs. We then coded a bar graph using PHP and JSON to display the hours slept by the user each day which was embedded onto the sleep tab and a line chart to display how much alcohol the user drank each day which was embedded onto the alcohol tab. We ran into a few difficulties whilst implementing these graphs and running SQL queries with PHP, but these were fixed by the end of the sprint. The comparison tab just contained a goal progress circle to show the user how much sleep they are getting on average compared to their set goal; however, after the sprint, a comparison graph displaying both sleep and alcohol was coded alongside the addition of goal lines to each of the graphs. This is so the user can see how close they are to their goals as well as see any obvious trends between their alcohol consumption and sleep schedule. Something we were unable to replicate from the design was the gantt chart which shows both sleep and alcohol, as it was too difficult to implement within the time frame, like changing the date interval for the displayed data.

We also made some additions to the login page: adding a radio button functionality to select which units the user is entering their weight with, adding validation checks to ensure the user is at least 16 years old and adding a remember me functionality. We also designed and created a profile page, which allows users to change their account information using SQL update statements. Finally, we made the sleep quality slider on the log data page, completing the website and just leaving leftover writeup.

Software Requirements Specification

We built on our initial requirements using the feedback we got from the students using the questionnaire. We ensured the requirements covered most of the features the students said they enjoyed or looked for within a PI system.

Our core functional requirements haven't changed throughout the process, this is because we set out our main goals as fairly vague and expanded upon them throughout the agile process. After we completed the high priority requirements, we decided to add and implement some lower priority ones, such as allowing the user to change their account details. However, during the development process we have altered the non-functional requirements, such as 5.4, by changing how often we held scrum meetings, and 5.6, by creating a product backlog to ensure everyone had something to do between meetings and sprint reviews.

We felt alcohol and sleep were very appropriate to focus on, with students being our target users. This is because student life in general has a lot of alcohol involved, especially since it may be a person's first time away from home and parents. Students may also find problems getting enough sleep, having late nights partying, or staying up doing coursework. With that in mind, we felt many students would be able to relate to having alcohol and sleep problems so felt this would be appropriate for our target users. This was then also backed by the questionnaire results with a majority of students drinking at least 1-2 times a week and not getting consistent sleep. From this information of focusing on this demographic we developed our requirements.

Use Cases:

Primary Actor: Students

Goals: Track sleep and alcohol consumption, compare data and set goals.

Tasks Performed:

- Student creates account
- Student logs in
- Student logs how much sleep they got and quality of sleep
- Student logs how many units they consumed
- Student analyses their sleep and alcohol data and compares it to their goal
- Student compares both sets of data
- Student sets sleep and alcohol goals
- Student edits profile information

Exceptions:

- Student enters invalid data when creating account : Appropriate error message pops up and student enters appropriate data
- Student enters wrong log-in data : Student re-enters correct data
- Student tries to set goals outside the acceptable range : Appropriate error message pops up and student sets the goal as an appropriate value

Priority: Essential, account must be created first

Frequency of use: Once per day

Channel to actor: Website interface

Our Functional requirements are split into a sub-category decided by the feature the requirement relates to:

Functional (system will do the following)		
1	Let users input/store/access data	Priority: High
2	User's can create an account/login/logout	Priority: High
3	Let users compare data overtime/ display a user's data	Priority: High
4	Let user's set goals/achievements	Priority: Medium

1. Let users input/store/access/edit data		
1.1	Let users input sleep data for a specific night including: hours slept, time slept from/until, number of times woken up, quality of sleep.	Priority: High Dependency: 1.3
1.2	Let users input alcohol data by estimating units drunk by description of alcohol type and volume drunk	Priority: High Dependency: 1.3
1.3	Let users choose the date for data entered	Priority: High
1.4	Have users enter personal information: password, email, name, date of birth, weight	Priority: High Dependency: 2

2. User's can create accounts/login/logout		
2.1	Let a user create an account by entering information in 1.4	Priority: High Dependency: 1.4
2.2	Let users change account details.	Priority: Low Dependency: 2.1
2.3	Let user login to account (with email and password) and logout of account	Priority: High Dependency: 2.1

3. Let users compare data overtime/displaying		
3.1	Display alcohol data with date.	Priority: High Dependency: 1.2, 1.3
3.2	Display sleep data with date.	Priority: High Dependency: 1.1, 1.3
3.3	Visualise sleep trends through graphs/charts.	Priority: High Dependency: 1

3.4	Visualise alcohol trends through graphs/charts	Priority: High Dependency: 1
3.5	Visualise combined (sleep/alcohol) trends through graphs/charts	Priority: High Dependency: 1
3.6	Let users refine what time period to visualise their data	Priority: Medium Dependency: 1
3.7	Display an interesting fact related to alcohol and sleep based on research.	Priority: Low

4. Set goals and achievements		
4.1	Let users set sleep goals: hours of sleep a night	Priority: Low Dependency: 3
4.2	Let users set alcohol goals: Units goal	Priority: Low Dependency: 3
4.3	Let users change goals	Priority: Low

Non-Functional		
5	Software Development Process	Priority: High
6	Background Research	Priority: High
7	Testing	Priority: High Dependency: 5
8	User Interaction	Priority: High Dependency: 5

5. Software Development Process		
5.1	The software process will use incremental practices to manage design, build and test features.	Priority: High
5.2	The software development will consist of 3 sprints.	Priority: High Dependency: 5.1
5.3	Each of the three sprints will last between 1 and 3 weeks.	Priority: Medium Dependency: 5.1, 5.2
5.4	Scrum meetings will be held twice a week.	Priority: Medium

5.5	During each sprint, review the functional requirements.	Priority: High Dependency: 5.2
5.6	A product backlog will be maintained during development consisting of a set of features identified.	Priority: Medium Dependency: 5.1
5.7	At the start of each sprint we will choose the relevant features from the product backlog to include in the sprint backlog.	Priority: Medium Dependency: 5.2, 5.6
5.8	Complete a sprint review at the end of each sprint	Priority: High Dependency: 5.2, 5.3, 5.5

6. Background Research		
6.1	<i>Must read and cite at least three articles in the area of Personal Informatics, at least one of which must be drawn from the reference section of this coursework document.</i>	Priority: High
6.1	<i>Should read and cite at least six articles of any kind.</i>	Priority: Medium

7. Testing		
7.1	Test plans created for each sprint.	Priority: Medium Dependency: 5.2
7.2	Towards the end of each sprint tests should be carried out.	Priority: High Dependency: 5.2, 7.1
7.3	Testing should be evidenced in the report with the inclusion of test case results.	Priority: High Dependency: 7.2

8. User interaction		
8.1	Navigation buttons should have easy to understand descriptions/icons.	Priority: Medium Dependency: 5.1
8.2	Website should be easy to use (number of steps between pages is low)	Priority: High 5.1

Design

Database

Due to the fact that our system would need to be storing and retrieving data from the user we thought it would be the most appropriate to create and use a database for which we used MAMP and PHPMyAdmin. During our first sprint, we developed this fully normalised relation schema:

User(Email, Password, Name, DateOfBirth, Weight)

Alcohol(AlcoholID, AlcoholType, UnitsPerML)

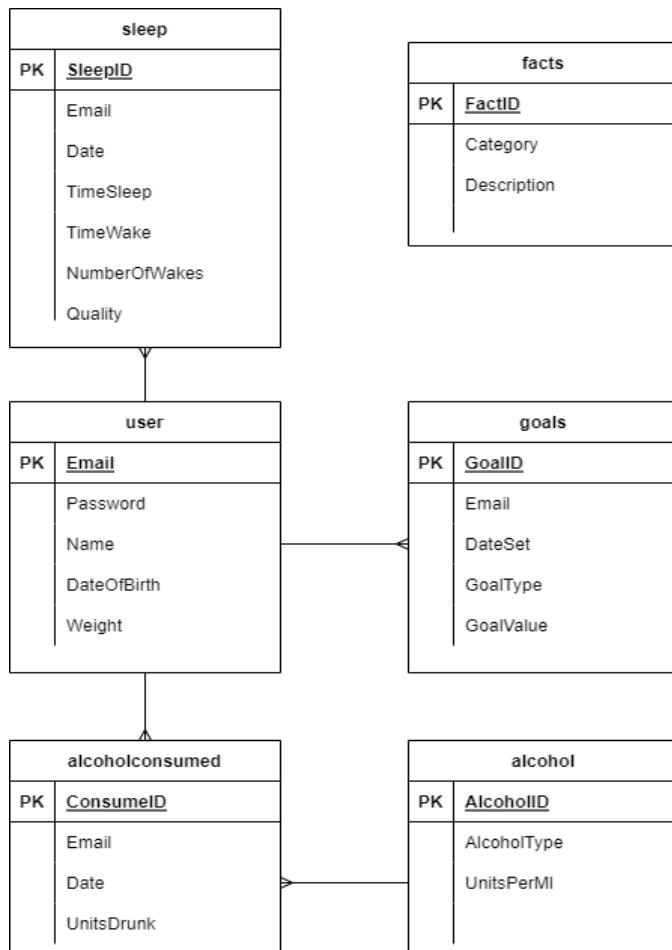
AlcoholConsumed(ConsumedID, Email, DateDrunk, UnitsDrunk)

Sleep(SleepID, Email, DateSlept, TimeSleep, TimeWake, NumberofWakes, Quality)

Goals(GoalID, Email, DataSet, GoalType, GoalValue)

Facts(FactID, Category, Description)

We developed the database first as we decided it was of high priority as storing data is the most fundamental aspect of the project and is integral to most of the highest priority requirements (1.1-1.4). Due to the fact it is in third normal form, we know that there is a reduced chance of inconsistencies in the data such as insertion, deletion or modification anomalies - making our system more reliable and improving user experience.



The structure of the database is also shown here in the form of an ER diagram that clearly shows the relationships between the tables.

We also considered the safety of our database to ensure that our software was defensively programmed. To do this, we made sure that all our SQL queries in the code were parameterized to guard against SQL injection. Another safety measure we took was to use hashing to protect the user's passwords so that if the database was compromised the passwords would still be secure.

Overall, the design of our database did not change much over the course of our sprints as it was something that we had designed with all future needs in mind as it is such a fundamental part of the project.

Figure 2 - ER Diagram

Class Diagram

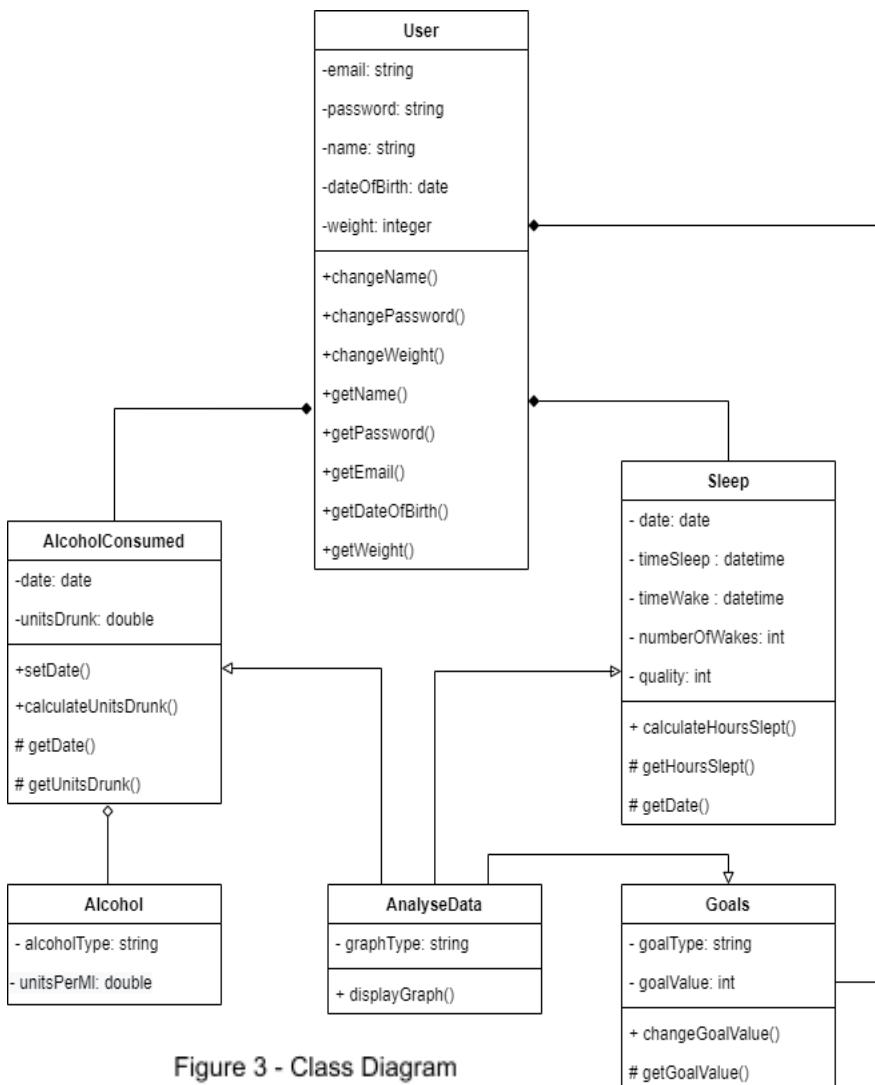


Figure 3 - Class Diagram

This class diagram shows the Object-Oriented approach to our system. It includes the relationships of inheritance, aggregation and composition as well as showing the attributes and methods of each class.

From this diagram we can see how each user is composed of alcoholconsumed, sleep and goals: as each user has each of these things and they could not exist without the user. We can also see that alcoholconsumed is aggregated with alcohol. This is because alcoholconsumed contains alcohol but alcohol can still exist without being consumed.

Finally, the analysis of the data inherits from goals, alcoholconsumed and sleep as it requires the protected methods to access the data from each class.

Context Diagrams

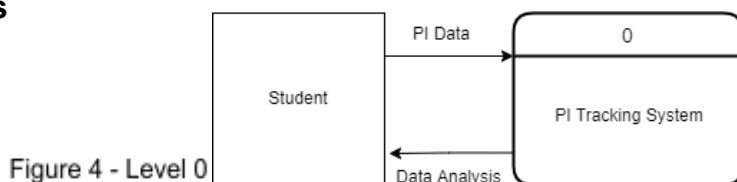
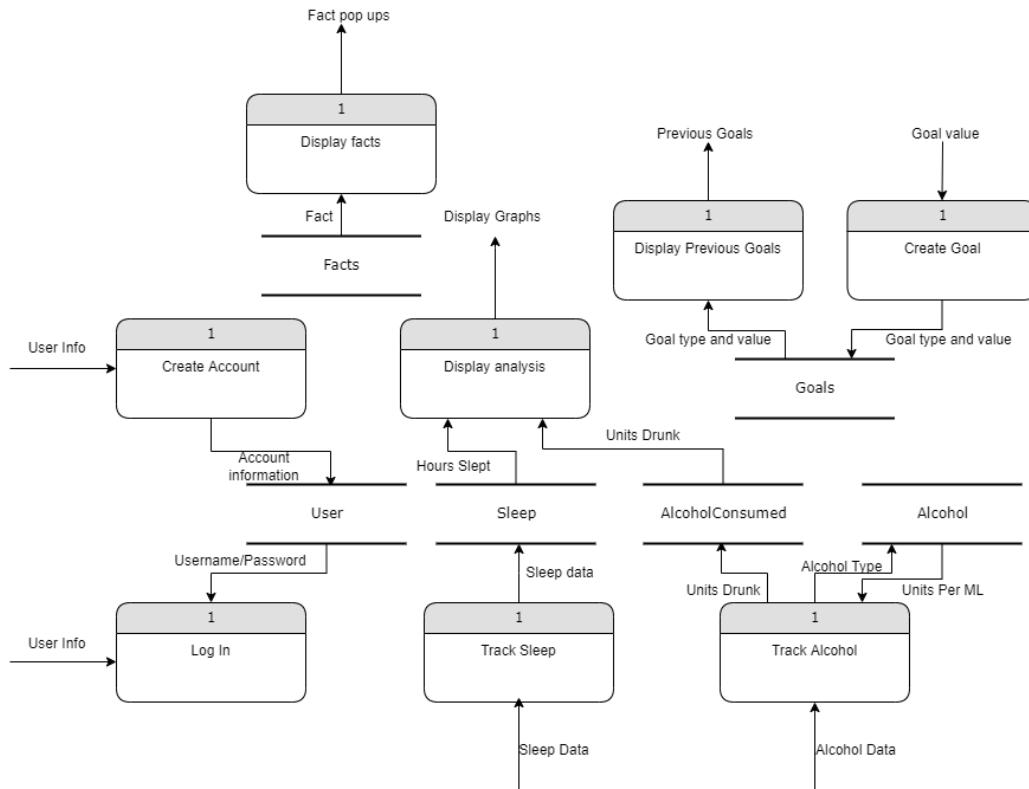


Figure 4 - Level 0

The level 0 context diagram shows the highest level of abstraction and gives a very basic overview of the data going in and out of our system. Despite being simple, it clearly visualises that our system fulfils requirements 1.1-1.4 (let users input/store data) and 3.1-3.7 (let users view and compare their data). It also shows that the only actor we have in the system is the students themselves. We decided to only have the users input their data rather than taking data from an external system (such as a fitbit) as it gives the user a greater sense of control over their data which was a specified preference of students in our research. Additionally, we decided that the learning curve of using an API would be too steep for the time we had for this project.



This level 1 context diagram expands on the details of the level 0 diagram and shows the flow of data throughout the system and how the system interacts with the data stores.

The data dictionary below expands on the data being passed throughout the system by specifying its data types and the accepted values that the data can take

Figure 5 - Level 1

Data Dictionary

TABLE	NAME	DATA TYPE	ACCEPTED VALUES
User	Email	String	contains '@'
User	Password	String	> 6 characters
User	Name	String	NOT NULL
User	DateOfBirth	Date	> 16 years ago
User	Weight	Integer	0 - 500
AlcoholConsumed/Sleep	Date	Date	<= today's date
AlcoholConsumed	UnitsDrunk	Double	>= 0
Sleep	TimeSleep	DateTime	<= today's date
Sleep	TimeWake	DateTime	<= today's date, > timesleep
Sleep	NumberOfWakes	Integer	0 - 100
Sleep	Quality	Integer	0 - 10
Goals	GoalType	Enum	'Sleep' or 'Alcohol'
Goals	GoalValue	Integer	>= 0

UML Sequence Diagram

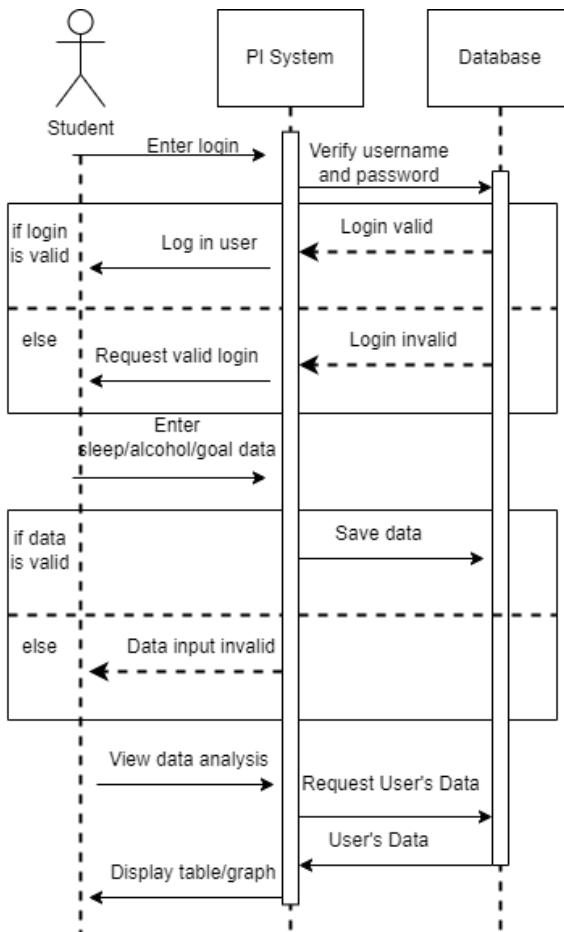


Figure 6 - Sequence Diagram

UML Case-Diagram

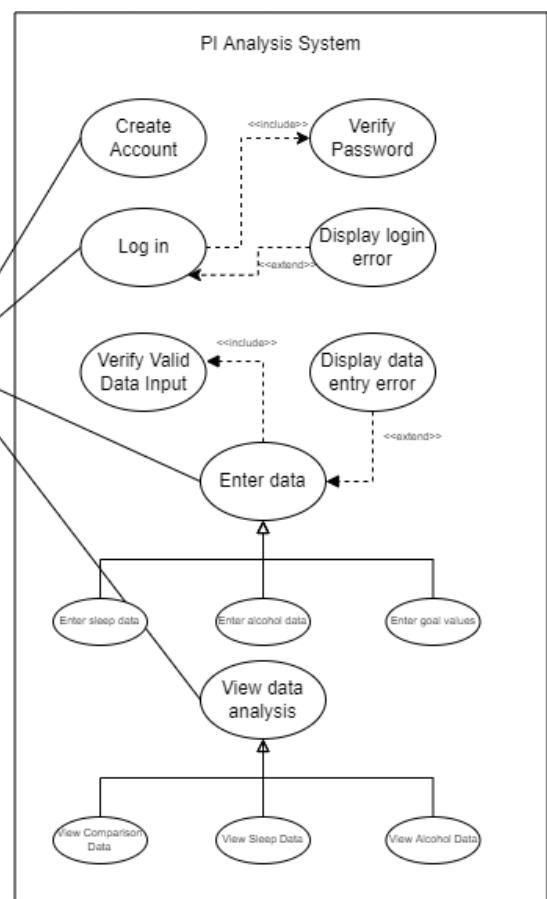


Figure 7 - Case Diagram

The sequence diagram is used to visualise a timeline of the interactions between the system and any external sources. In the example of our system, the external sources are the student and the database. The vertical lines represent the lifelines of each object and the rectangle boxes represent alternative scenarios based on the outcome of an event. By visualising the alternate events we can clearly see the validation taking place in the system and the database's responses depending on the input. In particular the sequence diagram is useful for visualising the processes that must occur in a specific order as opposed to the processes in the system that can happen at any time, for example the fact that the user must log in before any data may be entered into the system and that data must be entered into the system before data can be viewed or analysed.

The case-diagram models the behaviour and helps to capture the requirements of the system. It also helps to identify the interactions between the system and its actors. The diagram shows 5 use-cases within our system which all perform a particular function. Our diagram shows how the student actor interacts with all the use-cases and how some are composed of multiple sub-use-cases. The diagram also depicts the include and extend lines which show events that could happen as a result of a certain use-case. This gives a good idea of how we want elements of the system to be linked.

User Interface

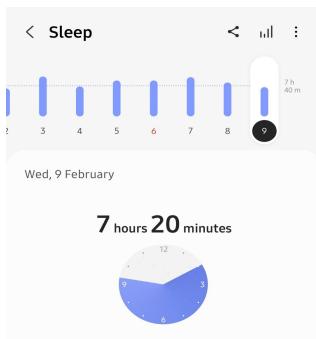
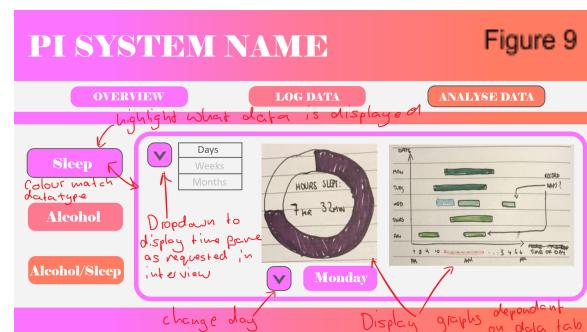


Figure 8

All of the designs for our user interface can be found in the [appendix](#). We began by designing the initial website UI during sprint 1 using feedback from the research conducted, including the user interviews as well as by using the designs of other similar systems such as Samsung Health. The log data page is a crucial page on the website as it allows users to enter the relevant PI data to store in a database. The analyse data page will display all of the entered data in a readable format to show the trends in the users sleep and alcohol consumption, and any correlation between the two. The log data page (fig 11) includes a number of standard interface elements, notably text fields, dropdown lists, and a slider.

On the analyse data page (fig 9), the main graphic for displaying the data was chosen as graphs and charts, reflecting users preferences in the survey conducted. Within this page, users will be able to switch between sleep and alcohol data, as well as seeing both combined.



We then designed each of the pages in more depth with explicit consideration of the software requirements detailed in the previous section. The navigation bar has buttons with simple descriptions, and the login and sign up buttons will also contain an icon, which meets the non-functional requirement 8.1. The design of the navigation bar also means that the number of steps between each page is generally just one (8.2). The log data page design (fig 12) meets several of the functional requirements in section one: let users input/store/access/edit data. The second page design was for the analyse data page (fig 13), which consists of tabs the user can click to switch between sleep, alcohol and combined analysis over a period of time that can be changed with a dropdown list. The design shows the sleep tab (3.2 and 3.3) over a week; however, figure 14 shows some alternate graphs we considered the webpage could display.

The next page design was for the goals page, which allows users to set goals and achievements. The first section allows users to enter a new sleep goal (4.1) and the second section allows for a new alcohol consumption goal (4.2); they can both be changed at any time (4.3). This provides encouragement for the user to improve their habits concerning both sleep and alcohol, and their progress will be shown on the analysis page, perhaps with a goal line on the graphs (4.3).

The final design page was the profile page, which allows users to edit their account details - notably their name, weight and password (2.2). This page also meets functional specifications in the first section (1.4 and 1.5). The page will display the current values for the user's personal information and then allow the user to re-enter this information before submitting it to the database. For security, the user will have to enter their current password in order to change it.

Software Testing (Verification)

Below is a table outlining the testing that we planned and carried out on our system. We tested throughout the scrum process, however we did not formalise the process until the end of the third sprint when we had all of the system completed. At the start of each sprint we created a test plan for the part of the system that we were planning to develop which helped guide us to creating a system that would fulfil requirements. We then used the results of these tests to update and plan the backlog for the next sprint as it informed us as to which elements of the system still need development. In the [appendix](#) we have provided screenshot evidence of the testing.

No.	Criteria	Type of Test	Test Data	Description	Expected Outcome	Actual Outcome
1	2.1	Valid	Email = a@b.c	Enter a valid email address.	Accept email address.	Pass
2	2.1	Erroneous	Email =	Leave the email address field empty.	Fail - should ask user to re enter their email.	Pass
3	2.1	Erroneous	Email = ab.c	Enter an email address without an @ symbol.	Fail - should ask user to re enter their email.	Pass
4	2.1	Erroneous	Email = a@b.c [x2]	Enter the same email twice.	Fail - should notify user that the email is already linked to an existing account.	Pass
5	2.1	Extreme	Password = abcdef	Enter a password that is 6 characters long.	Accept password as it is within the threshold.	Pass
6	2.1	Erroneous	Password = abcde	Enter a password that is 5 characters long.	Fail - should ask user to re enter a valid password.	Pass
7	2.1	Erroneous	Password = abcdef, password confirm = abcde	Enter different passwords to check that the verification system works.	Fail - should notify the user that the passwords don't match.	Pass

8	2.1	Erroneous	Name =	Leave the name field empty.	Fail - should ask user to enter their name.	Pass
9	2.1	Erroneous	Name = Abcd/	Enter a name that includes a special character which is not an underscore.	Fail - should notify the user that a name can only contain letters, numbers, and underscores.	Pass
10	2.1	Extreme	Date of birth = [Today's date]/06	Enter a birth date that means the user has just turned 16.	Accept the date.	Pass
11	2.1	Erroneous	Date of birth = [Today's date]/07	Enter a birth date that means the user has not turned 16 yet.	Fail - should notify the user that you need to be at least 16 years old to sign up.	Pass
12	1.1	Erroneous	Number of wakes = 0	Enter an invalid number of times woken up.	Fail - the system assumes that the user always wakes up at least once.	Pass
13	1.1	Valid	Number of wakes = 3	Enter a valid number of times woken up.	Accept the number of times woken up.	Pass
14	1.1	Erroneous	Don't select a sleep quality	Don't select a sleep quality in the system.	Fail - the system should notify the user to rate their sleep quality.	Pass
15	1.1	Valid	Quality = 3	Enter a valid quality rating.	Accept the quality rating.	Pass
16	1.3	Erroneous	Empty date	Leave the date field empty.	Fail - Any logging of data requires a specific date to be associated with it.	Pass
17	1.2	Valid	UnitsDrunk = 5	Enter a valid	Accept the	Pass

				number of units drunk.	number of units drunk.	
18	2.3	Erroneous	Email = aa@b.c	Enter an email that is not associated with any account in the database.	Fail - Notify the user that the email entered is not correct.	Pass
19	2.3	Erroneous	Password = abcde	Enter the wrong password for the account.	Fail - Notify the user that the password is not correct.	Pass
20	3.7	Presence	Presence check for researched facts	Check that the sleep and alcohol facts are correctly presented in a random fashion.	They should be present on the website.	Pass
21	3.6	Valid	Filter sleep/alcohol chart by date	Check that it is possible to filter the sleep and alcohol graph by date.	It should show the data for a specific time period.	Pass

Reflection and Conclusion

Critique of Software system's requirements specification, design and testing.

Our first software system's requirement specification was written after a substantial amount of research. This included conducting interviews, creating a questionnaire for our target audience and reading papers around SCRUM methodology as well as articles specifically about alcohol and sleep, our chosen problem areas. Collecting this information allowed the group to construct a clear idea of the functionalities of the software. Because of our prior research, our first writing of the functional requirements of the specification did not change dramatically once development had started as the group understood quite thoroughly the sort of product we wanted. The Non-Functional requirements changed the most out of all of the specifications. This is because many members of the group had not worked on a website application before and so figuring out the design and understanding how to implement the functionalities of the software came about as we developed the website further, deepening our understanding of the solution.

Our non-functional requirements could be improved by detailing more specifically about how the web application will perform. For example, during development we accounted for security by making sure to hash users' passwords when making an account. However, hashing user's passwords was not included in the requirements. By adding requirements more focused on the website's reliability, security and usability, we would have been able to focus more on these parts of software development and would have been able to improve the overall experience of the application. Another critique would be that based on the questionnaire we conducted at the beginning of the project, 85% of students preferred a mobile app for a Personal Informatics system. However, the group decided to create a website application due to familiarity. Creating the application for mobile would perhaps make the software more convenient for users to use.

By being more focused on the functional requirements, we've created a software system that achieves most of the functionality we set out to achieve but paid less attention to the non-functional requirements, resulting in a user experience that could have been more thoroughly thought through. An example would be that when a user enters their sleep data, they have to input the date three times. This can be quite tedious for the user and decreases the enjoyment of the application. We could have improved our requirement specification during the SCRUM methodology to include a requirement for ease of inputting data. In doing so we could have allocated tasks to members of the group to understand, design and implement the user input system to be more user friendly and intuitive, which would result in a better piece of software.

A critique of our software system's design is that whilst the system as a whole is designed on Object-Oriented Principles, being based on classes and inheritance, each page of the website was driven by a separate PHP script that shares some duplicated code. This is the code displaying the header of the website so that it is consistent across the pages. And whilst this did not cause any issues during development, if we were to extend the system further it would become tedious to implement and make the application harder to maintain.

Improvements could be made by making a base page that the other scripts inherit from. This would allow us to easily change aspects of the application that are consistent across multiple different pages.

Formal testing for our software system began quite late in the process due to important functionalities of the website only being fully completed in the later sprints. For example, the complete verifying and testing our input forms validation to create a user account to the database occurred after our 3rd sprint review. This meant that we left little time to be able to refactor code and our website design after the tests had been completed. To improve on this, we should have begun tests earlier in the process so that enough time was left after the test to examine our software to make improvements and in doing so, would create a better software system that follows more closely the software requirements made.

Our final product fulfils many of our functional and non-functional requirements, describing our Personal Informatics system focused on users managing their sleep and alcohol patterns. In comparison to other PI systems however, there are a lot of aspects of the website that could be improved. For example, [the Samsung Health Application](#) nicely displays sleep data through visualising a clock highlighting the time and duration of sleep. Our application instead displays this as a line chart showing the amount of time asleep but not when the user fell asleep and woke up. This shows that we could have displayed the data in more informative ways that are understood more intuitively. Another function that Samsung Health has that our system could have implemented is a graph showing the consistency of sleep. Whilst we had considered coding a ‘Gantt chart’ to illustrate this information, after researching the implementation, it was decided that it would have taken a long time to code with the group’s current knowledge of PHP and Javascript. With other priorities for the sprints, we decided to focus our time on other aspects of the project.

Critical reflection on the groups software process, evidence of Agility and having evolved your requirements to reflect changes in understanding of problems and viability of designs

Through the SCRUM methodology we were able to achieve agile practices including, continual improvement and flexible responses to changes in requirements and understanding of the problems to be solved. After each of the sprints we had a functioning locally host website that users could interact with. And with each sprint, the functionality of the website increased until most of our requirements were met. One specific example of this was breaking the development down into small increments such that each sprint would involve planning, design, coding. This meant that different members of the team could work on tasks they’d preferred to do. A couple of the members did not feel as confident with coding and since we’d split the tasks up, they were still able to contribute meaningfully with design or researching tasks. This meant that the group synergised well and for our sprints most of the tasks were completed on time.

Through our incremental development we were able to recognise that our planned interface, Flask, would cause issues later during development. We were able to adapt quickly and change the implementation of the website early in sprint 1 to use PHP. This involved having to rethink and conduct more research into how to develop the back end and front end design of the web application. Due to the SCRUM methodology and the regular SCRUM meetups,

we were able to quickly coordinate as a group to switch to using PHP and MySQL, with a working website at the end of the first sprint.

Our group managed to delegate and share tasks, such as through pair programming sessions. During our sprint 1 review, our SCRUM master suggested having pair programming sessions so that multiple members of the group could contribute to the coding of the website. This meant that members who were less confident in their coding skills could still complete programming tasks with some reassurance and assistance from another member. These pair programming sessions occurred alongside regular weekly scrum meetings. Pair programming was successful as it meant in later sprints that members felt more confident to code up a task individually since they had some experience built up from the sessions.

Closely tied to this is the use of GitHub to manage the source code of the website. Through having all the group members with access to the projects GitHub, it was simple for members to upload new versions of PHP scripts so that other members could download the newest updates and continue working on their tasks without overwriting the previous additions. However to improve our workflow, the group could have utilised branches and merging more. For the majority of the project the GitHub only had the main branch that the group would upload their updates to. This worked for our project as many people were working on different scripts and so overwriting someone else's work occurred rarely. However, if the system was to be expanded working on multiple branches would ensure that the website would remain functional whilst new features were being worked on.

One reflection on our software process was that our sprints were a little bit imbalanced; Sprint 2 lasted for around a week and a half compared to our much longer Sprint 3 which was spread over 3 weeks. To be expected our completed tasks for Sprint 2 were fewer and less substantial progressions compared to Sprint 3. Because of this imbalance, our sprint 2 review was less informative than it could have been and this also led to the issue that during sprint 3, because it was much longer, it was a little more difficult to keep track of tasks being done by whom and the amount of functionalities to complete were more. Collaboration on coding was harder as well because of this. The tasks and aims of sprint 3 were a little less specific and clear since the tasks were bigger ones to tackle. This led to a few functionalities that were identified during the sprint 3 review that were then implemented afterwards, such as the graph comparing alcohol and sleep data simultaneously.

Perhaps our group could have benefitted from more even sprints with a similar amount of time dedicated to each sprint so that the pace of development would have been more steady. This might have also led to clearer and more specific descriptions of assignments during the later part of development, making it easier for collaboration on coding the software.

References

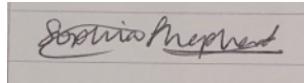
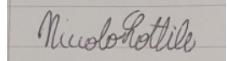
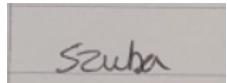
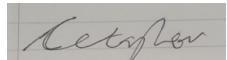
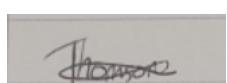
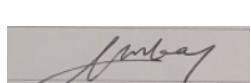
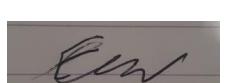
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Appendices

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Final Group Contribution Form

Group Member	Contribution	Signature
Sophia Shepherd	8	
Niccolo Sottile	9	
Robert Szuba	8	
Katie Taylor	9	
Samuel Thomson	8	
Amber Tong	8	
Elliot Whaley	4	

Elliot has decided to drop Computer Science and therefore only attended one of the in person meetings. When we asked him to do some tasks he did them and he communicated throughout, however he was not proactive when it came to contributing.

Record of Minutes

MEETING MINUTES

MEETING NUMBER: 01

DATE: 15/02

TIME: 3:15

ATTENDANCE:

- Sophia Shepherd
- Niccolo Settile
- Robert Szuba
- Katie Taylor
- Sam Thomson
- Amber Tong
- Elliot Whaley

NOTES ON ATTENDANCE:

Elliot is ill but summary of meeting was communicated via Discord

ISSUES DISCUSSED:

Meetings at the lab as well as Thursdays after the lecture.

Program will be for PC and use a database to store tracking data (using MYSQL)

For research and initial data we will send out form/survey

Using python as a programming language

The input method for the program will be via a website

The PI data that we will collect will be sleep and alcohol consumption.

How to quantify sleep and alcohol:

Sleep in hours

Use a drop down list of alcohol - calculate automatically the units

Track how their sleep was before, and then after drinking.

ACTIONS:

Do reading and take notes on key points:

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 - Amber
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 - Katie
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 - Sophia
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 - Robert
- Jones and Kelly (2016) "Finding 'Interesting' Correlations in Multi-Faceted Personal Informatics Systems" Proceedings of ACM CHI16 Conference on Human Factors in Computing Systems. pp 3099-3106
 - Niccolò
- Fritz et al. (2014) "Persuasive technology in the real world: a study of long-term use of activity sensing devices for fitness" Proceedings of the CHI2014 Conference on Human Factors in Computing Systems, pp. 487-496
 - Elliot
- Elements of user experience, Jesse James Garrett
 - Sam

For any questions contact: orw47@bath.ac.uk

NEXT MEETING:

DATE: 17/02/2022

TIME: 13:15

LOCATION: The Edge

MEETING MINUTES

MEETING NUMBER: 02

DATE: 17/02

TIME: 13:15

ATTENDANCE:

- Sophia Shepherd
- Niccole Sottile
- Robert Szuba
- Katie Taylor
- Sam Thomson
- Amber Tong
- Elliot Whaley

NOTES ON ATTENDANCE:

Elliot is ill but summary of meeting was communicated via Discord

ISSUES DISCUSSED:

Went through everyone's readings:

- Use achievements to help motivate users to keep using the PI
- Visualisation of data to help users with understanding
- Got to have different measurements of sleep: hours of sleep, what time you sleep, how often you wake up in the night, "how was your sleep"
- Two types of data: More quantitative and one more casual.
- What people want the most - is user's want surprising - something that they didn't expect (something to do with alcohol and sleep that is surprising) Intrinsic attractiveness: got to have a strong positive or negative correlation.
- Can be 'inaccurate' but more interesting is more important: two variables are more interesting than one.
- Plot alcohol on a linear graph
- If users manually put their data in, users withhold 'negative' things. Maybe use the "mostly agree, slightly agree, neutral, disagree, etc."
- Competition between friends! leadership board

ACTIONS:

Create survey/form (Google forms) [COMPLETED DURING MEETING]:

- Do you track sleep?
- Do you track alcohol?
- How/what do you think about the ways you currently track them?

Introduction (everyone):

Write up a paragraph for the introduction based on what you've read in your research.

Research: Look at link between

- alcohol and sleep
 - Amber, Robert
- sleep and students
 - Sam
- Alcohol and students
 - Elliot
- All three
 - Sophia

Database: Start listing data needing to be stored and begin normalisation - Katie, Nic

NEXT MEETING:

DATE: 22/02

TIME: 15:15

LOCATION: CB3.5

MEETING MINUTES

MEETING NUMBER: 03

DATE: 22/02

TIME: 15:15

ATTENDANCE:

- Sophia Shepherd
- Niccole Sottile
- Robert Szuba
- Katie Taylor
- Sam Thomson
- Amber Tong
- Elliot Whaley

NOTES ON ATTENDANCE:

Katie was ill, but meeting information was passed on to her via discord

ISSUES DISCUSSED:

- Went over the questionnaire, extra research and introduction write up.
- Good to interview a student with open ended questions on what features/ requirements they would like. What you like/ what you dislike. Ask questions based on sleep quality as well. Pattern with alcohol.
- Following what was taught in the lecture: decided the next step was to make the Requirement specification: made up of functional/non-functional requirements. Started this specification in the writeup document. To be finished next meeting
- Using a website is more accessible? Can access it from all devices with an internet connection. Some people don't have access to technology outside of uni. Allows them to access it too.
- Adding images to user interface, e.g. pictures of types of alcohol? Write up interview questions and conduct interviews to follow up questionnaire responses

ACTIONS:

Create a graph to show correlations between questionnaire findings

- Sophia

Read-up about requirements analysis and modelling: Pressman & Maxim:<https://ebookcentral.proquest.com/lib/bath/reader.action?docID=5989441> All of Chapter 7. Especially Sections 7.1 to 7.5 and Chapter 8, sections 8.1 and 8.2

- 7.1 Sophia
- 7.2 Amber
- 7.3 Katie
- 7.4 Sam
- 7.5 Elliot
- 8.1 Nick
- 8.2 Robert

NEXT MEETING:

DATE: 24/02/22

TIME: 14:05 **LOCATION:**Outside_CB

MEETING MINUTES

MEETING NUMBER: 04

DATE: 24/02

TIME: 14:15

ATTENDANCE:

- Sophia Shepherd
- Niccole Sottile
- Robert Szuba
- Katie Taylor
- Sam Thomson
- Amber Tong
- Elliot Whaley

NOTES ON ATTENDANCE:

Robert was ill but was informed of what happened in the meeting via discord

ISSUES DISCUSSED:

Stages of requirement development as per reading from textbook from last meeting

Talks about having an interview

Discussed document capture of other popular tracking apps e.g. Samsung/Apple health

Requirement snapshots as software is developing.

Wrote interview questions

Made requirement specification

Edited database structure in line with requirements discussed so far

ACTIONS:

Interviews

- Katie
- Sam

Screenshot Samsung sleep tracker

- Katie

Conditional probability from questionnaire + write a paragraph.

- Sophia

Contents table and headings for sections on write up/screenshot Apple sleep tracker

- Amber

Write a paragraph on Personal Informatics generally for introduction

- Elliot

Read other chapters from last week

- Robert
- Nic

NEXT MEETING: Tuesday Lab

DATE: 01/03/22

TIME: 15:15

LOCATION: CB.3.5

MEETING MINUTES

MEETING NUMBER: 05

DATE: 01/03

TIME: 15:15

ATTENDANCE:

- Sophia Shepherd
- Niccole Sottile
- Robert Szuba
- Katie Taylor
- Sam Thomson
- Amber Tong
- Elliot Whaley

NOTES ON ATTENDANCE:

Elliot had to sort out next years housing stuff, Sam and Amber were ill but were informed of what happened in the meeting via discord

ISSUES DISCUSSED:

Discussed the interviews carried out since last meeting

Spoke about starting our first sprint

Set up a Trello account to track the sprint progress

Created a provisional sprint backlog for first sprint

Recommended reading by SCRUM master:

Non-functional tasks should be done first : setting up structure/databases etc. (Book to read:

Elements of user experience by Jesse James Garret)

'Design of everyday things' book - examples of good UX

Last implementation/tasks should be aesthetics focused

ACTIONS:

Since multiple members were absent from this meeting we decided to wait to assign tasks for the first sprint until everyone could be present to discuss them.

NEXT MEETING:

DATE: 3/03/22

TIME: 15:00

LOCATION: DISCORD

MEETING MINUTES

MEETING NUMBER: 06

DATE: 03/03

TIME: 15:00

ATTENDANCE:

- Sophia Shepherd
- Niccolo Sottile
- Robert Szuba
- Katie Taylor
- Sam Thomson
- Amber Tong
- Elliot Whaley

NOTES ON ATTENDANCE:

ISSUES DISCUSSED:

Discussed and created a sprint backlog for our first sprint and put it on Trello

Assigned everyone in the group one or multiple tasks from this backlog

Agreed for everyone to send a progress update report on Discord in 3 days (6/03/22)

ACTIONS:

Design and create database on phpmyadmin and write SQL insert statements for data

- Katie

Validation on database entries

- Elliot

Design and set up website

- Nic

Write testing table

- Sam

Write algorithm to convert alcohol type and volume to units

- Robert

Research alcohol types and their units per ml to add to database

- Amber

Carry out tests described by testing table

- Katie

Research flask as a means to create our website with python

- Sophia
- Nic
- Robert
- Katie
- Sam

NEXT MEETING:

DATE: 8/03/22

TIME: 15:15

LOCATION: CB 3.5

MEETING MINUTES

MEETING NUMBER: 07

DATE: 08/03

TIME: 15:15

ATTENDANCE:

- Sophia Shepherd
- Niccolo Sottile
- Robert Szuba
- Katie Taylor
- Sam Thomson
- Amber Tong
- Elliot Whaley

NOTES ON ATTENDANCE:

Amber has COVID but information for the meeting was conveyed via Discord

ISSUES DISCUSSED:

We went over the actions that we each did since last meeting

We agreed that our first sprint review will be 15/03/22

We discussed whether we should use XAMPP or SQLAlchemy and decided to use XAMPP
All members were instructed to download visual studio code and run the code from the Github page so that we all have access and can edit the code

ACTIONS:

All members download a version of Xampp, as well as install Flask so that next meeting we can connect the database.

NEXT MEETING:

DATE: 10/03/22

TIME: 14:15

LOCATION: Outside lecture

MEETING MINUTES

MEETING NUMBER: 08

DATE: 10/03

TIME: 14:15

ATTENDANCE:

- Sophia Shepherd
- Niccolo Sottile
- Robert Szuba
- Katie Taylor
- Sam Thomson
- Amber Tong
- Elliot Whaley

NOTES ON ATTENDANCE:

Amber has COVID and Robert has work, but information for the meeting was conveyed via Discord

ISSUES DISCUSSED:

We attempted to connect the database and the website that we have made using Flask however encountered a lot of technical issues to do with the compiler and decided that Flask was perhaps too buggy to use - we have decided to go forward using PHP.

We sent out a group contribution form for the first sprint and asked everyone to assess their own contribution.

We sent out a list of tasks that can be completed via Discord and also put them on the Trello for the people who were not at the meeting.

ACTIONS:

Look into how to prevent SQL injection when putting data into the database

- Katie

Write paragraph for design section on the failure of flask and moving to use PHP

- Sophia

Write paragraph about the agile process so far

- Amber

Write paragraph about the interviews carried out, for the introduction

- Elliot

Convert the backend to PHP

- Niccolo

Look at writing our Non-functional requirement specification

- Sam

Create ER diagram for database

- Robert

NEXT MEETING:

DATE: 15/03/22

TIME: 15:15

LOCATION: CB 3.5

MEETING MINUTES

MEETING NUMBER: 09

DATE: 15/03

TIME: 15:15

ATTENDANCE:

- Sophia Shepherd
- Niccolo Sottile
- Robert Szuba
- Katie Taylor
- Sam Thomson
- Amber Tong
- Elliot Whaley

NOTES ON ATTENDANCE:

Elliot and Nic joined the meeting via call as they could not be there in person. Robert was at work.

ISSUES DISCUSSED:

SPRINT 1 REVIEW:

Having more tasks in sprint backlog - set more than we think you can do

Sprint two: prioritise what didn't get done in sprint one

Scrum master: Irw47

Pair programming is a good idea. Everyone should be exposed to the technical aspects

We wrote a backlog for sprint 2

Decided to have a meeting on Thursday online to assign tasks for sprint 2.

Other:

Setting up website with MAMP

ACTIONS:

- Write up notes from sprint review
- Send sprint 1 contribution form to scrum master

NEXT MEETING:

DATE: 17/03/22

TIME: TBC

LOCATION: Discord

MEETING MINUTES

MEETING NUMBER: 10

DATE: 17/03

TIME: 15:15

ATTENDANCE:

- Sophia Shepherd
 - Niccolo Sottile
 - Robert Szuba
 - Katie Taylor
 - Sam Thomson
 - Amber Tong
 - Elliot Whaley
-

NOTES ON ATTENDANCE:

ISSUES DISCUSSED:

Gave everyone tasks for Sprint 2

ACTIONS:

NEXT MEETING: CB 3.9

DATE: 22/03/22

TIME: 15:15

LOCATION: CB 3.9

MEETING MINUTES

MEETING NUMBER: 11

DATE: 22/03

TIME: 15:15

ATTENDANCE:

- Sophia Shepherd
- Niccole Sottile
- Robert Szuba
- Katie Taylor
- Sam Thomson
- Amber Tong
- Elliot Whaley

NOTES ON ATTENDANCE:

Elliot couldn't join because of train delays

ISSUES DISCUSSED:

Discussed how to operate github

ACTIONS:

Design graphs for:

- Alcohol vs sleep hours
- Alcohol vs sleep quality
- Sleep hours vs days/weeks/months (sleep consistency)
- The week showing sleep hours from time fallen asleep to wake up

Fix bugs related to MAMP

Add validation to data entry on website

Link dropdown on alcohol to database and add alcohol volume textbox

Add functionality of login page

NEXT MEETING:

DATE: 24/03

TIME: 2:15

LOCATION: Outside lecture

MEETING MINUTES

MEETING NUMBER: 12

DATE: 24/03

TIME: 14:15

ATTENDANCE:

- Sophia Shepherd
 - Niccolo Sottile
 - Robert Szuba
 - Katie Taylor
 - Sam Thomson
 - Amber Tong
 - Elliot Whaley
-

NOTES ON ATTENDANCE:

ISSUES DISCUSSED:

Added log in/sign up functionalities, implementing validation checks

Checkbox for pounds/kilograms coded

Designed log-data page

ACTIONS:

Write up an update paragraph before sprint review

NEXT MEETING:

DATE: 29/03

TIME: 2:15

LOCATION: CB 3.5

MEETING MINUTES

MEETING NUMBER: 13

DATE: 29/03

TIME: 15:15

ATTENDANCE:

- ~~Sophia Shepherd~~
 - ~~Niccolo Sottile~~
 - ~~Robert Szuba~~
 - ~~Katie Taylor~~
 - ~~Sam Thomson~~
 - ~~Amber Tong~~
 - ~~Elliot Whaley~~
-

NOTES ON ATTENDANCE:

ISSUES DISCUSSED:

Did the sprint 2 review

Updated codes to coordinate everyone's progress

Discussed making sprint 3 a longer 3 week sprint to allow the backlog to be cleared

ACTIONS:

Write up the sprint 2 review

Set a date for the sprint 3 review - 19/04/22

NEXT MEETING:

DATE: 31/03/22

TIME: 2:15

LOCATION: Outside lecture

MEETING MINUTES

MEETING NUMBER: 14

DATE: 31/03

TIME: 14:15

ATTENDANCE:

- Sophia Shepherd
 - Niccolo Sottile
 - Robert Szuba
 - Katie Taylor
 - Sam Thomson
 - Amber Tong
 - Elliot Whaley
-

NOTES ON ATTENDANCE:

ISSUES DISCUSSED:

ACTIONS:

Assigned sprint 3 tasks

NEXT MEETING:

DATE: 31/03/22

TIME: 2:15

LOCATION: The Temple

MEETING MINUTES

MEETING NUMBER: 15

DATE: 05/04

TIME: 15:15

ATTENDANCE:

- Sophia Shepherd
- Niccolo Sottile
- Robert Szuba
- Katie Taylor
- Sam Thomson
- Amber Tong
- Elliot Whaley

NOTES ON ATTENDANCE:

ISSUES DISCUSSED:

Discussed the ability for the user to change their email

Made sure everyone's code was synced with the latest version of github

Continued with peer programming

ACTIONS:

Everyone should carry on taking on tasks from the Trello sprint 3 backlog in preparation for our sprint 3 review

NEXT MEETING:

DATE: 7/04/22

TIME: 2:15

LOCATION: Outside lecture

MEETING MINUTES

MEETING NUMBER: 16

DATE: 7/04

TIME: 2:15

ATTENDANCE:

- Sophia Shepherd
 - Niccole Sottile
 - Robert Szuba
 - Katie Taylor
 - Sam Thomson
 - Amber Tong
 - Elliot Whaley
-

NOTES ON ATTENDANCE:

ISSUES DISCUSSED:

More peer programming

ACTIONS:

Everyone to finish their tasks from the sprint 3 backlog
Sprint 3 review will take place 20/04/22 at 12 online

NEXT MEETING:

DATE: 20/04/22

TIME: 12:00

LOCATION: Online

MEETING MINUTES

MEETING NUMBER: 17

DATE: 20/04

TIME: 12:00

ATTENDANCE:

- Sophia Shepherd
- Niccole Settile
- Robert Szuba
- Katie Taylor
- Sam Thomson
- Amber Tong
- Elliot Whaley

NOTES ON ATTENDANCE:

Elliot had to go to hospital

ISSUES DISCUSSED:

Made sure all of us have downloaded the work that others have done

Sprint 3 review: what got done, what didn't get done and what do we still have to do

ACTIONS:

Assigned tasks on the write-up

NEXT MEETING:

DATE: 25/04/22

TIME: 11:00am

LOCATION: The Temple

Transcript of Interviews

INTERVIEW QUESTIONS

1. Do you currently track your sleep, why? If so, how?
2. Do you currently track your alcohol consumption, why? If so, how?
3. How is your sleep currently?
4. How is your alcohol consumption currently?
5. Do you feel like there is a correlation between the amount you drink and the sleep you get?
6. What type of software would you be most likely to use to track this data? E.g. windows, mobile, website
7. How would you like to enter sleep data?
8. How would you like to enter alcohol data?
9. What would motivate you to sleep more?
10. What would motivate you to drink less?
11. How would you like your data to be displayed? E.g. bar chart, line chart, percentage increase
12. Which data would you like displayed? E.g. sleep time on clock or hours, units/alcohol type
13. For what period of time would you like to compare data? E.g. weeks/months/years
14. How long do you want your data to be stored for?
15. What would you like the user interface to be like? E.g. all on one page/tabs/scroll
16. What kind of goals/achievements/challenges could be implemented to motivate you?
17. Is there anything else you would want to receive from an application like this?

INTERVIEW TRANSCRIPT

INTERVIEW NO: 01

DATE: 24/02/22

TIME: 7:30

LOCATION: ONLINE

INTERVIEWER: Katie Taylor

INTERVIEWEE: Marlo

1. Yes I do, because it's the healthy thing to do. If I didn't then I wouldn't get enough sleep. I just track my sleep nightly in my head at the moment, I don't use any apps or track anything long-term.
2. Yes I do, because otherwise I would end up drinking too much and being sick. Drinking often for me can do bad things for my physical and mental health so I try to avoid that. I remember how many drinks I've had in a night and I try to limit how many times a week I drink.
3. Sometimes good, sometimes bad - it varies. Bad for me is when I get less than 6 hours sleep or if when I wake up and go to sleep is at weird times like 3pm and 5am.
4. I drink probably once a week but when I do drink I usually drink about 20 units on a night out.
5. On the nights I do drink and go out I don't get as much sleep, but because I don't drink regularly I don't notice how alcohol actually affects my sleep quality.
6. Mobile app
7. I would like to be able to enter both the hours slept and the times that I went to bed and woke up for flexibility.
8. I would like to be able to input which drinks and how many I've had into the system and for it to calculate the number of units for me, rather than me having to put the units in myself.
9. Having reminders would be good I think - like if I got a reminder when I should be going to bed that would encourage me to go to sleep early so I would get more sleep. Maybe something like you lose points if you're on your phone past the time you set for your bedtime.
10. I don't know if anything could motivate me to drink less.
11. A graph or percentages would be nice - maybe a personalised message would be cool that gives a good indication of how you've done over the time period e.g. "Well done you've drunk less this week"
12. For alcohol I don't think the type of alcohol that I've drunk really matters enough to be displayed - just the units are enough. For sleep, both time and hours would be good.
13. Weeks
14. For me I think a month would probably be enough - I'm not that interested at looking at the long term
15. As long as the user interface is simple to understand I don't mind. I'd rather it be clean and clear looking than super complicated.
16. A weekly goal for sleep and alcohol that I could meet would be nice so I feel like I've achieved something at the end of the week.
17. Not really!

INTERVIEW TRANSCRIPT

INTERVIEW NO: 02

DATE: 28/02 **TIME:** 8:00

LOCATION: Accomodation

INTERVIEWER: Sam Thomson

INTERVIEWEE: Anna

1. No, because it's too much effort. I do take note of when I don't get much sleep though.
2. No, I'm usually too drunk to accurately know how much I've been drinking.
3. Restless, I usually get between 4 and 5 hours.
4. Minimal at the moment.
5. No, because I do not drink regularly enough for it to affect my normal sleep pattern.
6. Mobile.
7. I would like to enter the amount of sleep, times slept from and to, whether I woke up in the night, and the quality of sleep as well.
8. A drop down list of alcohol and the ability to put in how much of each you drunk, as well as typing in the type of alcohol manually.
9. Comparisons between good nights of sleep and bad nights of sleep and possibly a mood tracker correlating with nights of sleep.
10. Showing you money spent on alcohol.
11. Bar chart and percentage increase.
12. Sleep time in hours, and units and alcohol type.
13. Days, weeks and months but probably not years.
14. A year maximum.
15. Not all on one page, but so it's really easy to switch between different views, for example months and days.
16. Money saved, with something like "You could have bought this instead." Showing a mood increase compared to how well you sleep. Also setting a goal for amount of sleep, maybe a calculation based on when you have to be up to suggest when you should sleep.
17. No.

Questionnaire Questions and Results

QUESTIONNAIRE

Alcohol and Sleep Questionnaire

Questions for our Software Processes and Modelling coursework on developing a Personal Informatics (PI) system that will track alcohol consumption and sleep with the aim of finding correlations between the two.



samalthomson@gmail.com (not shared) [Switch accounts](#)



*Required

Which year of study are you in at University? *

- Year one
- Year two
- Year three
- Year four
- Year five
- Year six and above

Do you currently track your alcohol consumption? *

- Yes
- No
- Sometimes

Do you currently track your sleep? *

- Yes
- No
- Sometimes

Tracking apps section is only shown if yes is chosen for either “Do you currently track your alcohol consumption?” or “Do you currently track your sleep?”

Tracking apps

What do you use to track your sleep? *

- Wearables (e.g. smart watches)
- Applications on smartphones
- Bed Sensors
- Bedside Devices

What app are you using? *

- Samsung health app
- Apple health app
- Other: _____

What do you like about the app you are currently using? *

- The user-interface
- Data visualised using graphs
- Achievements/Rewards
- Set goals/objectives
- Track data over time
- Compare data with friends
- Notifications
- Learning new things

What do you dislike about the app you are currently using?

- Notifications
- The user-interface
- Subscriptions
- Too many options
- Too few options
- Too competitive
- No ability to share data
- Bit boring over time
- Entering data is time-consuming/hard

Alcohol and Sleep Questionnaire

Questions for our Software Processes and Modelling coursework on developing a Personal Informatics (PI) system that will track alcohol intake and sleep with the aim of finding correlations between the two.

What platform would you prefer to use with a tracking app? *

- Website
- Desktop application
- Mobile app

How many hours of sleep on a weekday do you typically get? *

- less than 4 hours
- 4 - 6 hours
- 6 - 7.5 hours
- 7.5 - 9 hours
- 9+ hours

How many hours of sleep on Saturday/Sunday? *

- less than 4 hours
- 4 - 6 hours
- 6 - 7.5 hours
- 7.5 - 9 hours
- 9+ hours

How inconsistent is your sleep schedule? *

- Consistent! Wake/sleep around same time everyday
- Somewhat consistent: +- 1 hour between days
- Not very consistent: No 9am lectures is a good day for extra sleep
- Very inconsistent :(

How often do you drink? *

- When am I not?
- Everyday
- 3-4 times a week
- 1-2 times a week
- Couple times a month
- Couple times a year
- Never

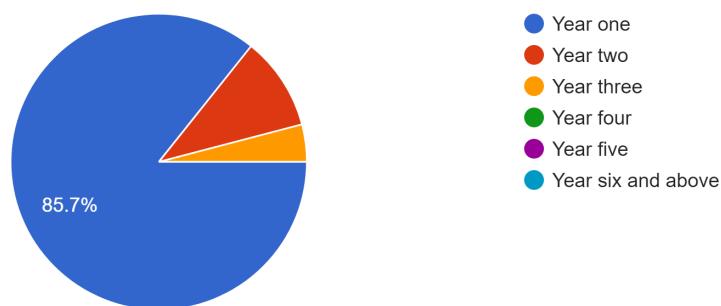
How much do you typically drink? *

- Don't feel anything
- Slightly tipsy
- Drunk texting my ex
- Can't walk straight
- Blackout
- I'm sober friend

RESULTS

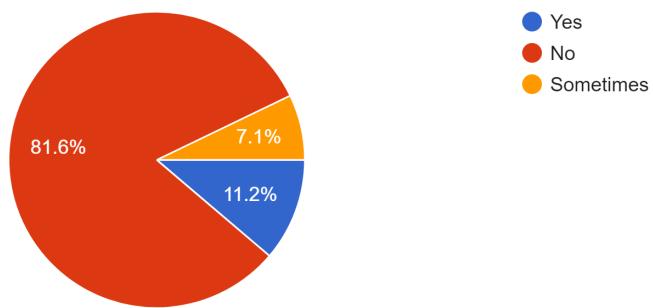
Which year of study are you in at University?

98 responses



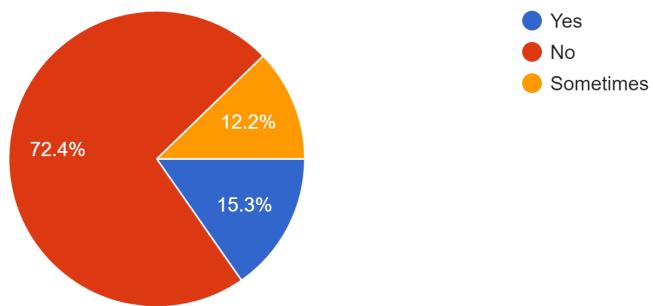
Do you currently track your alcohol consumption?

98 responses



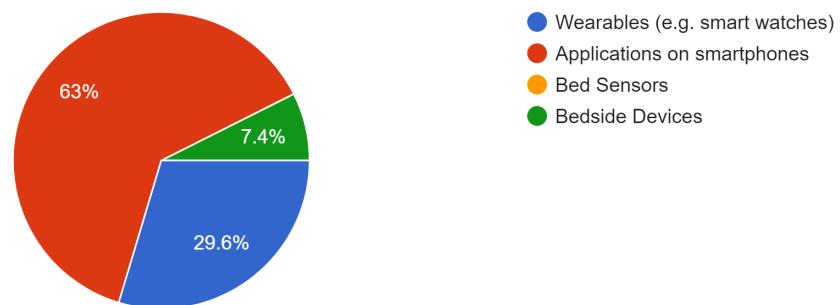
Do you currently track your sleep?

98 responses



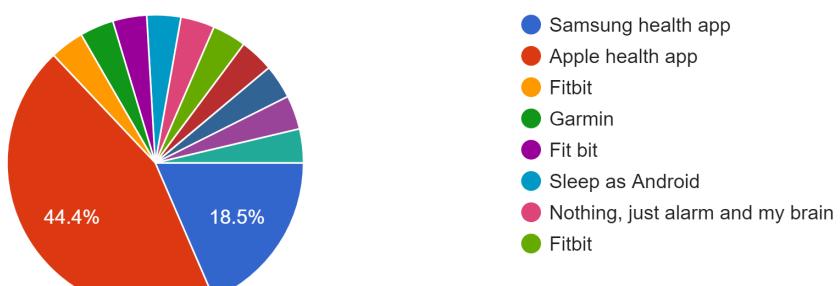
What do you use to track your sleep?

27 responses



What app are you using?

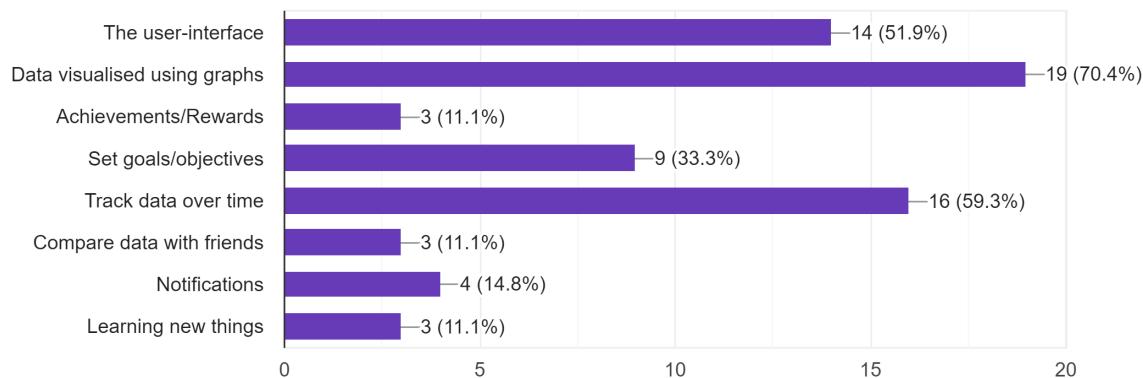
27 responses



▲ 1/2 ▼

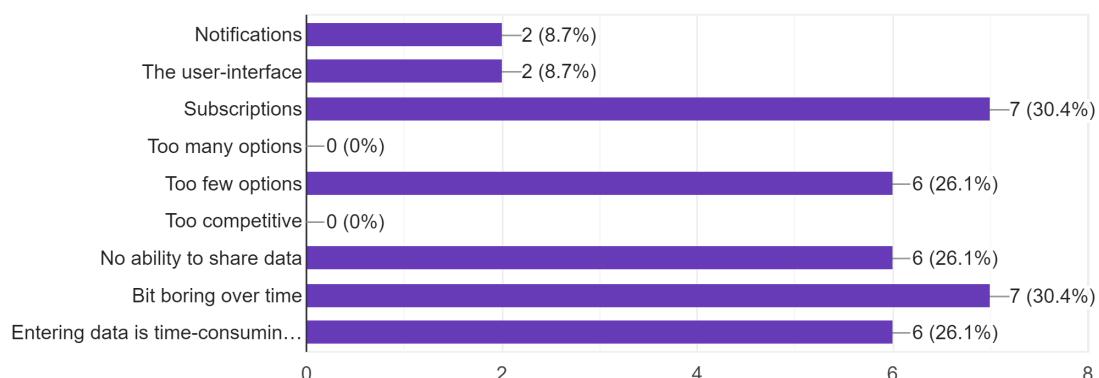
What do you like about the app you are currently using?

27 responses



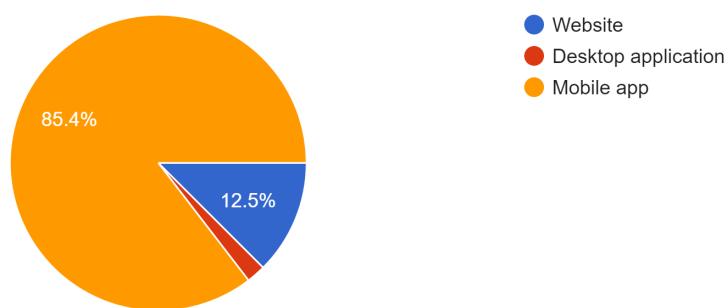
What do you dislike about the app you are currently using?

23 responses



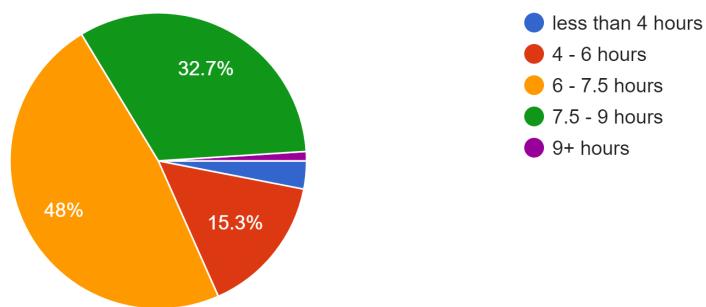
What platform would you prefer to use with a tracking app?

96 responses



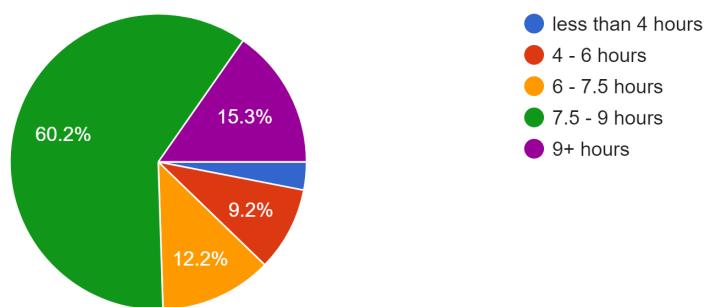
How many hours of sleep on a weekday do you typically get?

98 responses



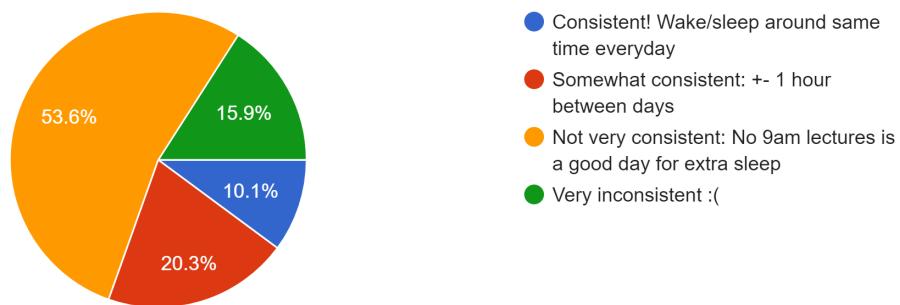
How many hours of sleep on Saturday/Sunday?

98 responses



How inconsistent is your sleep schedule?

69 responses



● Consistent! Wake/sleep around same time everyday

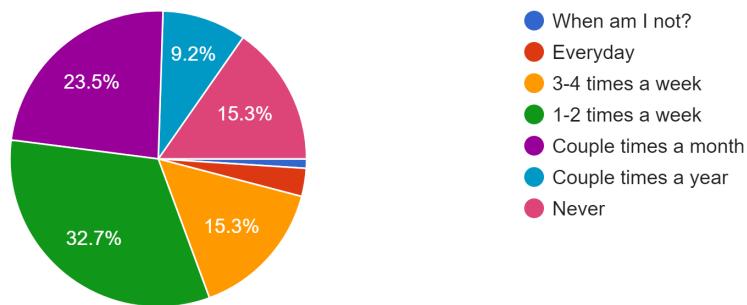
● Somewhat consistent: +- 1 hour between days

● Not very consistent: No 9am lectures is a good day for extra sleep

● Very inconsistent :(

How often do you drink?

98 responses



● When am I not?

● Everyday

● 3-4 times a week

● 1-2 times a week

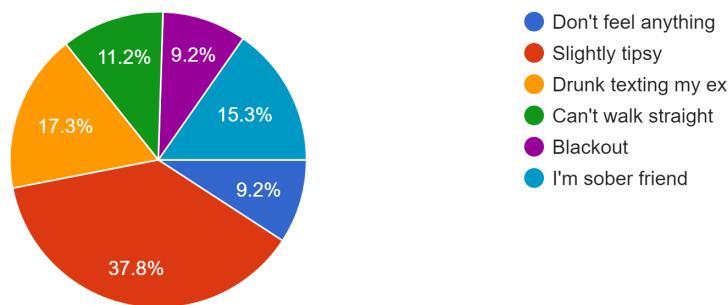
● Couple times a month

● Couple times a year

● Never

How much do you typically drink?

98 responses



● Don't feel anything

● Slightly tipsy

● Drunk texting my ex

● Can't walk straight

● Blackout

● I'm sober friend

Sprint Reviews

SPRINT REVIEW 1

DATE: 15/03/2 **TIME:** 15:15 **LOCATION:** CB 3.5 **SCRUM MASTER:** Luke Worgan

WHAT DID WE DO IN SPRINT 1:

- Researched the general topic of personal informatics
- Researched sleep and alcohol consumption in students
- Carried out a questionnaire and interviews of students to research habits in relation to sleep and alcohol consumption and the way they track them
- Created a website using PHP for students to use to input and track their data
- Created a database using SQL to store the data inputted by students
- Wrote SQL statements to insert data entered into textboxes on the website into the correct fields of the database
- Created a testing plan table for data entry into the website

WHAT DID WE NOT DO IN SPRINT 1:

- Use Flask as a backend for our website
- Carry out testing plan on the website
- Parameterised SQL inserts

WHAT WILL WE DO IN SPRINT 2:

- Make login function active
- Create the data analysis page of the website
- Parameterised SQL queries
- Carry out testing of the website
- Allow users to change data (e.g. change password)

SPRINT REVIEW 2

DATE: 29/03/2 **TIME:** 15:15 **LOCATION:** CB 3.5 **SCRUM MASTER:** Luke Worgan

WHAT DID WE DO IN SPRINT 2:

- Parameterised SQL queries
- Added dropdown options from the database for the alcohol and sleep
- Added volume of alcohol to log-data page
- Validated the log-data page
- Added a primary key to all the tables on the pidatabase
- Added a login/signup function
- Created an account page - checkbox for pounds or kilograms
- Changed the password entry to asterisks
- Designed graphs to display the data i.e. which graphs where/what type
- Designed log-data and analyse page
- Created a website design diagram

WHAT DID WE NOT DO IN SPRINT 2:

- Add alcohol to database functionality
- Validation of DateOfBirth and Weight elements of Sign-Up page form

WHAT WILL WE DO IN SPRINT 3:

- Goals page
- Analysis page: displaying user's data in graphs and other visual representations
- Write up

SPRINT REVIEW 3

DATE: 20/04/22 **TIME:** 12:00 **LOCATION:** Online **SCRUM MASTER:** n/a

WHAT DID WE DO IN SPRINT 3:

- Coded bar graph displaying how long the user slept on a certain day
- Coded line chart displaying how much alcohol the user drank on a certain day
- Added a goal progress circle to show how much sleep a user is getting compared to their sleep goal
- Implement the fun fact pop ups
- Worked on implementing the graphs in the analyse data page (in particular the bar chart), fixed some bugs when running sql queries with php.
- Add the conversion of alcohol type and volume to units on alcohol data entry
- Set up tabs for each type of graph on analyse data page
- All users to change their account info on the profile page
- Add goals and profile pages
- Put facts into the database
- Added validation for entering a DOB from the future
- Added radio button functionality for selecting the weight units
- Added a table displaying previous goals
- Designed profile page
- Designed goal page
- Put designs into write up document with explanation
- Sprint two write up
- Made the slider on the log data page discrete
- Added the remember me functionality on the login page
- Added a validation to ensure users signing up are at least 16 years old

WHAT DID WE NOT DO IN SPRINT 3:

- Gantt chart displaying both sleep and alcohol comparison
- Changing date for data shown on graph
- Add goal line to graphs

WHAT WILL WE DO BEFORE DEADLINE:

- Do a comparison graph for sleep and alcohol
- Add goal line to graphs
- Write-up

Trello Page

The image shows a collection of Trello boards and cards from a project, overlaid on a background image of a snowy mountain landscape. The boards include:

- Product Backlog**: A board with a banner image of penguins. Cards include "List of all the tasks to be done" (SS), "Tasks for sprint 3 identified" (1), "Change banner on Analysis page" (SS), and "Create a comparison chart displaying both sleep and alcohol" (SS).
- Sprint 3 Backlog**: A board with a banner image of people working at a desk. Cards include "Make video" (SS), "+ Add a card" (SS), "Move anything you've started working on here" (1), "Validation on max entries for goals here" (RS), and "Add goal alcohol line to graph" (SS).
- Implementing**: A board with a banner image of a person working at a desk. Cards include "Validation on max entries for goals on here" (1), "Move anything from doing to done here" (1), "Display sleep goals as a circle progress bar" (SS), and "Move anything from doing to done here" (1).
- Testing/Waiting on something**: A board with a banner image of a person stretching. Cards include "Move anything from doing to done here" (1), "Parameterise SQL queries" (AT, KT), "Add log in / Sign up functionality" (NS, SS), "Create account page - checkbox for pounds or kilograms" (RS), and "Link dropdown to the alcohol table rather than being typed in" (AT, KT).
- DONE Sprint 3!**: A board with a banner image of a person running. Cards include "Move anything from doing to done here" (1), "Validation on database entry" (EW), "Connect database with website (front end and back end) using PHP" (AT, EW, KT, NS, RS, ST, SS), "Design and create database" (KT), and "Look into SQL injection in PHP for data collected" (KT).
- DONE Sprint 2!**: A board with a banner image of a sunset over water. Cards include "Create login / register pages in HTML/CSS" (NS), "Export phpmyadmin database" (KT), and "Write paragraph on why we didn't" (RS).
- DONE Sprint 1!**: A board with a banner image of a sunset over water. Cards include "+ Add a card" (SS), "+ Add a card" (KT), "+ Add a card" (RS), and "+ Add a card" (KT).

Example of a Sprints Full List of Completed Tasks

The image displays two side-by-side screenshots of a digital task list application, likely Trello or a similar Kanban board.

Left Screenshot: A vertical list of completed tasks. Each task card has a small icon at the top right indicating its status (e.g., NS, ST, AT, EW, RS, SS). The tasks are:

- DONE Sprint 1! 🎉
- Move anything from doing to done here
- Validation on database entry (EW)
- Connect database with website (frontend and backend) using PHP (AT, EW, KT, NS, RS, ST, SS)
- Design and create database (KT)
- Add alcohol data to database (KT)
- Look into SQL Injection in PHP for data collected (KT)
- Create login / register pages in HTML/CSS (NS)
- Export phpmyadmin database (KT)
- Write paragraph on why we didn't use flask (SS)
- Write SQL for data being entered to database (DML) (KT)

Right Screenshot: A vertical list of completed tasks. Each task card has a small icon at the top right indicating its status (e.g., NS, ST, AT, EW, RS). The tasks are:

- Design website (NS)
- Non-functional requirement specification (ST)
- Research: Alcohol type and units data (AT)
- Test table (ST)
- Algorithm to alcohol type and volume to units (RS)
- Write paragraph about interview (EW)
- Write a paragraph in the Agile Software process planning (AT)

Bottom Right: A button labeled "+ Add a card" with a plus sign and a file icon.

User Interface Designs

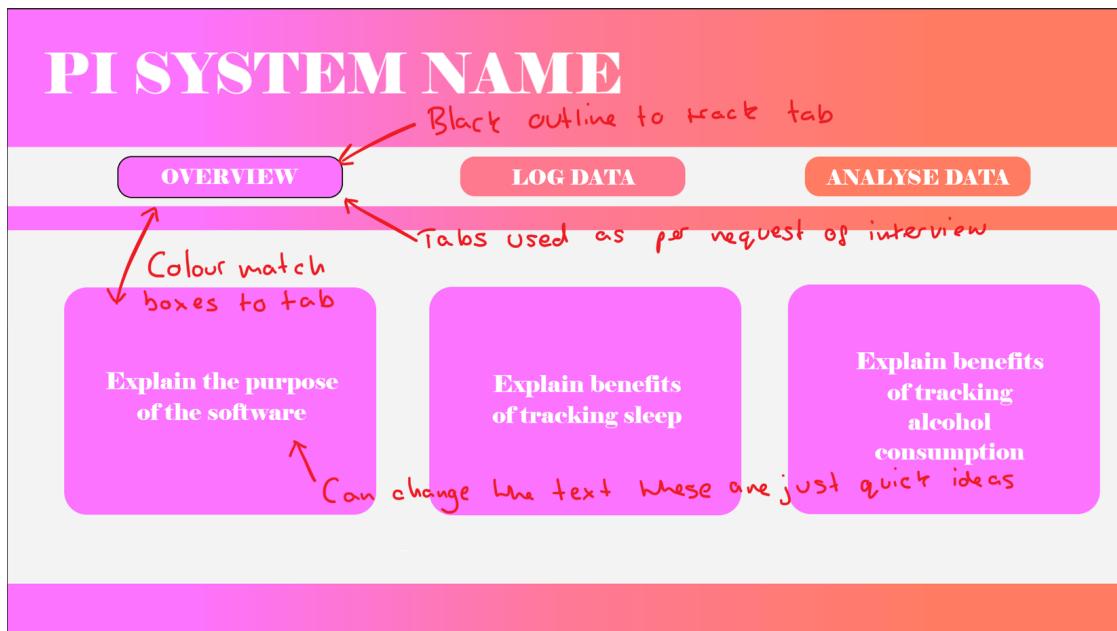


Figure 10

Mo	Tu	We	Th	Fr	Sa	Su
28	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10

Mo	Tu	We	Th	Fr	Sa	Su
28	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10

Figure 11

PI SYSTEM NAME

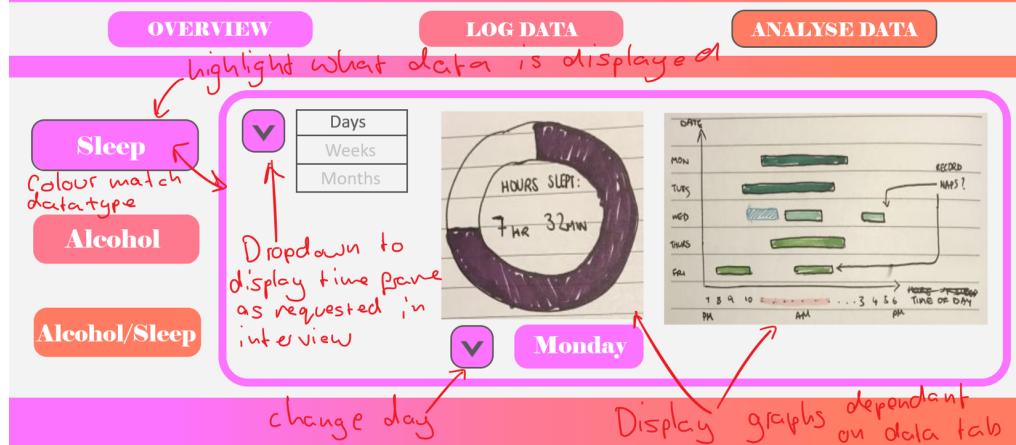


Figure 9

PI System (Sleep and Alcohol) Overview Log data Analyse data Goals Login Sign up

How was your sleep?

Date:

Sleep time:

Wakeup time:

Number of wakes:

Sleep quality:

Submit

How's the hangover?

Date:

Alcohol drank:

Volume drank: ml

Submit

Figure 12



Figure 13

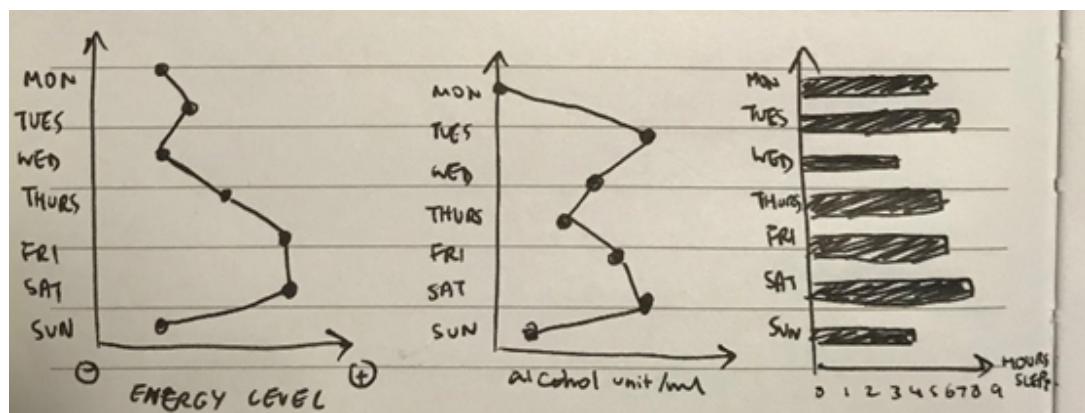


Figure 14

This screenshot shows the "Goals" section of the PI System interface. It includes two input fields for setting goals: one for sleep ("How much sleep do you want to get each night?") and one for alcohol ("How many units do you want to limit yourself to this week?"). Each field has "Current goal:" and "New goal:" input boxes and a "Submit" button.

Figure 15

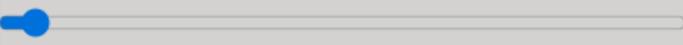
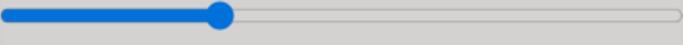
This screenshot shows the "Profile" section of the PI System. It includes four input fields for editing personal information: name, weight, and password, each with "Current" and "New" fields and a "Submit" button. To the right of these fields is a summary section titled "Sleep" for "Wed, 9 February", showing a bar chart of sleep duration from 3 to 9 hours and a circular clock indicating "7 hours 20 minutes".

Figure 16

Figure 8

Test case results

No.	Output obtained	Test passed
1	<p style="text-align: center;">Email:</p> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <input type="text" value="a@b.c"/> </div>	Yes
2	<p style="text-align: center;">Email:</p> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <input type="text"/> </div> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <p>Please enter an email.</p> </div>	Yes
3	<p style="text-align: center;">Email:</p> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <input type="text" value="ab.c"/> </div> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <p>Invalid email format.</p> </div>	Yes
4	<p style="text-align: center;">Email:</p> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <input type="text" value="a@b.c"/> </div> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <p>This email is already taken.</p> </div>	Yes
5	<p style="text-align: center;">Password:</p> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <input type="password" value="*****"/> </div>	Yes
6	<p style="text-align: center;">Password:</p> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <input type="password" value="*****"/> </div> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <p>Password must have at least 6 characters.</p> </div>	Yes
7	<p style="text-align: center;">Password:</p> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <input type="password" value="*****"/> </div> <p style="text-align: center;">Confirm password:</p> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <input type="password" value="*****"/> </div> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <p>Passwords do not match.</p> </div>	Yes
8	<p style="text-align: center;">Name:</p> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <input type="text"/> </div> <div style="background-color: #e0e0e0; padding: 5px; border-radius: 5px;"> <p>Please enter your name.</p> </div>	Yes

9	<p>Name:</p> <p>Abcd/</p> <p>Name can only contain letters, numbers, and underscores.</p>	Yes
10	<p>Date of birth:</p> <p>22/04/2006 </p>	Yes
11	<p>Date of birth:</p> <p>22/04/2007 </p> <p>You must be at least 16 years old to sign up.</p>	Yes
12	<p>Number of wakes:</p> <p></p> <p>Please enter how many times your sleep was interrupted.</p>	Yes
13	<p>Number of wakes:</p> <p>3</p>	Yes
14	<p>Sleep quality:</p> <p> 0</p> <p>Please rate your sleep quality.</p>	Yes
15	<p>Sleep quality:</p> <p> 3</p>	Yes
16	<p>Date:</p> <p>dd/mm/yyyy </p> <p>Please enter a date.</p>	Yes
17	<p>Volume drunk:</p> <p>5</p>	Yes
18	<p>Email:</p> <p>aa@b.c</p> <p>Enter a correct email.</p>	Yes

19	<p>Password:</p> <p>*****</p> <p>Password not correct.</p>	Yes										
20	<p>FUN ALCOHOL FACT!</p> <p>Alcohol misuse is the biggest risk factor for death, ill-health and disability among ages 15-49 in the UK, and the fifth biggest risk factor across all ages.</p>	Yes										
21	<table border="1"> <thead> <tr> <th>Date</th> <th>Consumption (approx.)</th> </tr> </thead> <tbody> <tr> <td>2022-04-14</td> <td>11</td> </tr> <tr> <td>2022-04-15</td> <td>11</td> </tr> <tr> <td>2022-04-16</td> <td>7</td> </tr> <tr> <td>2022-04-17</td> <td>9</td> </tr> </tbody> </table>	Date	Consumption (approx.)	2022-04-14	11	2022-04-15	11	2022-04-16	7	2022-04-17	9	Yes
Date	Consumption (approx.)											
2022-04-14	11											
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2022-04-17	9											