sHEETLESS

Evaluation Documentation – Graded Unit 2025

Dundee & Angus College

HND Software Development

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# Outline of the assignment

Sheetless is a Digital Production Traveller storing system. The system is used by the company MEP Technologies, a company based in Dundee that are known for their specialty towards the design and production and manufacturing of batteries and advanced battery systems for a wide multitude of use such as drones, robotics or electric vehicles. The system allows their personnel to Browse available Production Travellers, edit a Production Traveller and view submitted Production Travellers. In the back end of the system, it is automatically storing these production travellers in the database and sorting them in numerical order of Traveller ID which aids in simple storage and access.

Throughout the development and testing phase of the Project I took an existing paper-based Production Traveller system and made it digital whilst trying to keep the system simple and easy to use for the company staff.

# Original Requirements and were they implemented?

The following section will be using a Traffic Light system to categorise the implementations of the Project Requirements, they can be found below:

* Met
* Partially Met
* Not Met

## Functional Requirements

Secure Log-in System (High Priority)

A Login system would allow for the system to be more secure by only allowing a select group of individuals into the system that it was intended for, in this case would be the employees of MEP Technologies. A Log in system is expected to:

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| **Requirement** | **Was It Met?** | **Comments** |
| Allow Authorised Employees to access the specific system without issue thus not disrupting workflow | Met | The Login system implemented successfully allows those who are permitted users at MEP Technologies to access the system. |
| Block any unauthorised log-in attempts to the secure system. i.e Anyone that does not work with the company or its partners. | Met | The Login system is created to ensure that unauthorised users cannot gain entry to the restricted system. Those who don’t have the required login credentials may not access the system and are stuck viewing the login screen. |
| Log-In System is expected to meet security requirements and standards which would include protection against the likes of SQL Injection or other forms of malicious attacks in order to gain entry. | Met | When creating the login system, the priority was ensuring that it is protected against attacks such as SQL Injection to prevent any breaches, The login system on final build has these barriers in place. |

Template System (High Priority)

A Template system would allow for the ease of access to all the various traveller logging sheets that MEP Technologies uses for its daily production processes. The template system would work in a way that when logging into the system it provides the worker with its choice of traveller sheet for the specific project they are currently working on.

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| **Requirement** | **Was it Met?** | **Comments** |
| Provide the end user with a selection of traveller sheets for the respective project, either allowing them to search for it or hiding the travellers that the worker would not be working on for easy discovery. | Partially Met | Production Travellers are provided to the end user in the dashboard menu, due to restrictions on Production Travellers I was allowed to use, only 2 options are available.  Due to this, a search function for travellers were not needed, the simple template system design also aids in this reasoning. |
| Traveller sheets that have been selected by the end user is expected to auto fill out the respective data such as the current date of the day being viewed. | Met | Automatic date is filled out automatically using JavaScript, the date is added to all the date fields based on the day it is edited on. |
| Optionally provide a logging system that shows data of when a traveller was uploaded to the database and what time it was uploaded followed by a reference number for easy of discovery. This feature could make it into final build given no time constraint issues. | Met | This feature was fully implemented into the System under a submitted travellers page, all content initially provided in this requirement was implemented in the final build. |

Database System (High Priority)

A Database can be used in various ways that could be beneficial for countless implementations or projects. A Database is planned to be connected to this digitalised system that would store the traveller sheets that are submitted by Production staff through the production line.

In this project of moving a paper-based system to digital, a database would prove to be extremely useful for the traveller storage. All the traveller sheets being generated have to be stored somewhere, a database will be the place that all the sheets and its relevant information and data are stored in. Such additional information stored with the database via fields could be Traveller Unique IDs for simple searching or Exact date and time it was submitted.

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| **Requirement** | **Was it Met?** | **Comments** |
| Database System | Met | Due to being a High Priority Requirement and is fundamental to the project being functional and successful.  This was one of the first requirements I had worked on and completed. The Database stores Login credentials and Production Traveller Data not limited to its Unique ID Number, its fields and its data the end user inputs from the system. |

Device Compatibility (High Priority)

Device Compatibility is very important when considering a system that is being created for browser use, this will allow for the system to be viewed on any device or resolution which adds to its responsiveness. Per MEP Technologies Regulations, Mobile phones are prohibited from being used in the Production Area due to possible distractions near heavy machinery, this measure is in place with safety in mind as a number one priority. The system at hand will be planned to be used on a desktop resolution with Optionally Tablet view given no time constraints near the end of development.

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| **Requirement** | **Was it Met?** | **Comments** |
| Desktop Device Compatibility | Met | As documented, the system works the best when viewing from a desktop system. This requirement was a high priority to complete so that the end user and myself developing the system can use it fluently without any content not appearing correctly or going off screen. |
| Laptop Device Compatibility | Met | Laptop Device Compatibility was implemented in line with Desktop compatibility using Media Queries in the CSS. Per regulations, mobile devices that are not desktop or laptops are permitted in active production areas which I had to work around to implement. |

Search System & Fault Detection (Medium Priority)

The thought of a search function in theory is a simple addition that may not provide any assistance however this is incorrect. A Search function is extremely useful when trying to locate a specific unit or traveller sheet especially when you are dealing with thousands of entries. This also works in line with a fault detection system that would allow the production staff or management to look up a unit and investigate what the fault is, retrieve the traveller sheet and pull it off the production line. A Search function is an extremely important function that improves overall user efficiency by speeding up the task process. Such other uses of this important implementation are:

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| **Requirement** | **Was it Met?** | **Comments** |
| Easily access any traveller sheet by searching through the database with its unique identifier, an associate can easily access and retrieve the traveller sheet and its contents in a timely manner quicker than how long it would take in the manual system. | Met | In the finalised version of the project, you can locate a submitted traveller via submitted travellers page, each submitted entry has its own unique identification number to be located. |
| In the event of a faulty unit, the search functionality can swiftly locate the unit in question and pull it off the production line for closer inspection by Quality Assurance and Associates. | Not Met | By the end of development, the search function was not implemented within the given timeframe due to focussing on other higher priority requirements. If more time was allocated, I would like to implement this as its exceedingly useful for Staff. |

Form Revision (Low Priority)

After discussions with the client on requirements, per request they would like an addition that would allow the management staff to easily swap over to a new revised version of a traveller sheet. This process undergoes critical decisions with each member of staff to ensure that the revision is required, necessary and important. Once the new layout is approved by all managers the traveller sheet format revision will be integrated into the digitalised system for all workers and staff to view and use. The Client has confirmed that this addition is implemented based on time constraints near the time of its implementation.

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| **Requirement** | **Was it Met?** | **Comments** |
| Form Revision Feature | Not Met | Due to being a low priority the form revision feature was not implemented into the final version of the project. More time was allocated to higher priority requirements and if more time was provided, it would be implemented. |

Exporting (Low Priority)

Export feature per request from the client to be implemented based on no time constraints in development, Export feature would function in a way that would allow management or Stock room staff to Export the database into other formats like Microsoft Excel, this is currently used for all stock logging and would help the company with not disrupting current active operations. The export function is expected to:

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| **Requirement** | **Was it Met?** | **Comments** |
| Allow stockroom staff or other associates to export the data into another format for continued logging. | Not Met | Due to being a low priority requirement the Exporting feature that was requested as an optional requirement was not added due to working on implementing higher priority requirements. |
| Not disrupt current production and logging processes. | Met | Outside of the exporting feature, the finalised system is created to not disrupt ongoing production within the company. |
| Avoid unnecessary design choices in the exporting feature to allow for staff to export the data they require as soon as possible. | Not Met | With the exporting functionality not being implemented, the design was not created for reasons discussed above. |

In the end after overviewing the implemented functional requirements, I’m satisfied with all the High Priority functional requirements that were implemented within the timeframe. The system in itself is a secure which is protected against unauthorised users and is protected against attacks against SQL Injection which would at most be attempted in the System Access Portal. Preferably I would have preferred to get more Medium and Low priority requirements implemented but this opens a door for a plan to work on the project in the future to meet the features set out by the client.

## Non-Functional Requirements

### System Usability

* All Developed systems should be created and designed with usability in mind, providing the end user with the best experience with user friendly designs is crucial for a well create application/system. Other aspects of Usability can be covered in Jakob Nielsen’s 10 Heuristics of Usability.

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| **Requirement** | **Was it Met?** | **Comments** |
| Designs should be created with Usability and HCI in mind | Met | All Designs and User Interface choices were implemented whilst taking a HCI standpoint for the end user. Content is displayed professionally and spread out enough for users to understand and use. |

### Time

* Planning Phase Documentation should be completed by 24/02/2025 to make sure that all areas of development are covered and planned to ensure project success within its deadline.
* Development Phase should be completed by 21/04/2025 the time given should be enough time for development, testing and fixing of any issues or changes per client request or feedback.

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| **Requirement** | **Was it Met?** | **Comments** |
| Planning Phase should be completed by 24/02/2025 | Met | Planning phase was completed and submitted within the strict deadline given. |
| Development Phase should be completed by 21/04/2025 | Met | Development phase was completed and submitted before the deadline; Project was submitted on **20/04/2025**. |

## Standards

* Source Code for the system should be professionally commented to meet modern code standards.
* Methods/Variables should be named correctly with use of conventions like camelCase
* Front-end Designs should be created to be user friendly with minimal white space with considering UCI.

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| **Requirement** | **Was it Met?** | **Comments** |
| Comments are Professional and readable | Met | All comments throughout the project (HTML, PHP, JavaScript & CSS) are commented professionally and contain just enough information to understand what sections the code belongs to and in some cases understand what it is doing. |
| Methods/Variables are named correctly using naming conventions | Met | Methods, Variables and Functions are using efficient naming conventions. |
| Designs are created with HCI and Usability in Mind | Met | As Discussed in the above section, Designs are professional and clean which also follow HCI and are user friendly. |

# Strengths & Weaknesses Throughout the Project

Also discuss on matters relating to the client (Head of Production) giving feedback on the finished project, The following strengths & Weaknesses could be:

## Strengths

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| **Strengths From the Project** | **Strength Description** |
| Passionate | During the project I was passionate about creating this system for MEP Technologies which takes a paper-based Production Traveller System and shifts it to a digital format for easier use. Creating web-based projects is what I am good at and quite enjoy it more than other projects outside the Web sector. Due to being passionate I really enjoyed working on the project even if I never got everything I wanted added by the deadline. |
| Determined | Whilst developing the Sheetless Digital Traveller System I had somewhat of an inside knowledge on the needs and requirements of what this system would require. Whilst developing I knew that MEP Technologies required this system as even a simple digital based system would be far more efficient than the current paper-based system which is what drove me to fully complete the system to the best of my ability whilst taking into consideration bugs or other roadblocks that may prevent me from fully achieving this goal. |
| Documentation | Throughout the whole project from planning to development and testing, I would say my documentation has been created very well and structured professionally. This is including the User Guide which aids the End User in navigating and using the system that was created. Having in depth documentation can be extremely useful when trying to learn about a system that you don’t have any knowledge on and I’m proud of myself for being able to create the documentation for the project. |
| Adaptability | There was numerous occasions during the development process where something didn’t work out, something did work but did not fit in the system I was creating or was removed during development, all of these cases prove that I can adapt around issues during a tight deadline project, finding new ways around issues to create a working system by the end of the project deadline. |

## Weaknesses

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| **Weaknesses From the Project** | **Weaknesses Description** |
| Time Management | As discussed previously, I believe that my time management during the development phase of the project was below par. Ideally, I should have set myself specific goals to be completed on a daily basis within a limited timeframe for getting them completed. With an improved grasp on time management, I could have gotten more features implemented and or provided a higher quality end product and moving forward having learnt upon this i know that setting milestones is crucial to a successful project. Ensuring that all distractions are minimal will aid me in completing my goals set out to myself and in which I plan to learn and improve for future projects or work to avoid a lower quality product. |
| Project Scope | During the planning phase of the project, I feel I did set my bar too high in regard to features planned to be implemented during the tight deadline, having all these features that I tried to add in the little time somewhat overstressed me which resulted in a poorer quality project. |
| Familiar Territory | During development I tended to try to develop using the ways I know that function and work from other past web projects instead of fully going into the deep end with completely new ways to complete a task. Other UI Elements were all completed brand new and adapting to new ways to complete something when it did not go to plan did help me strive away from this weakness which I’m happy about and plan to continue to step out of my comfort zone in terms of this for projects. |
| Client Contact | I feel I should have been in contact with the client of the project more than what it was, after the planning phase of the project my contact to my client was almost none – in the industry I would usually be in constant contact, showing the client the current progress with the project, ensuring that what is currently created meets their standards and expectations, any feedback on what can be changed during development in order to meet these expectations. In future projects I plan to keep an open contact with my client if there is one for the project, I’m completing in order to ensure that its success meets requirements. |

# Recommendations for Future Development

Throughout the development stage there was numerous occasions of which I have done poorly or could have done better, this section is dedicated to discussing these cases:

* Time Management, ensuring that I have specific tasks to be completed during the day or research into an area of which I plan to develop. During the development phase of the project, I had poor time management skills which resulted in less time to focus on lower priority requirements. In return the finished project had less features than I wanted to have implemented.
* Design, Try and follow the wireframe designs to match the final design as much as possible. In development when designing the user interface and design I tried to create the interface to follow the wireframes, whilst doing this I tried to make it better and more efficient which in reality I should have just followed the wireframes exactly. In future I would like to create better wireframes which are easier to follow and have efficiency in mind from the start.
* Keep in contact with the client, Preferably I should have kept in contact with the Client (Head of Production) to ensure that I was on track with the development and the system was at the quality they were expecting. After the planning phase the contact with the client was minimal until the testing phase where the Head of Production allocated time to test run the system.
* Branch out to new experiences, in future development projects I would like to continue on trying new implementations for example, during development I tried my hand at Supa base, an open-source Firebase Alternative providing a PostgreSQL Database which is cloud based. During development I tried to get this to work with my Project which ended up failing and I went back to MySQL with PhpMyAdmin using XAAMP Control Panel. I feel if I continued on a little longer to attempt to get this to function correctly it would have made the project just that bit better having learned this.

With all the recommendations and points I have discussed in this section of the evaluation. I plan to learn upon what I could have done better and include these in future development projects to provide a higher quality final product and or project.

# Summary of modifications to the project plan, design and implementation

1. In the early stages of the development phase of the project, I attempted and intended to use a cloud-based PostgreSQL Database called Supa base. I spent a few days working on Supa base, trying to learn how it worked and how I could implement it into my project. After a few days I was struggling with getting it to work with my project in return I opted to stop trying and moved to a local MySQL Database which I have previous knowledge on from previous projects.
2. When designing the user interface and its elements, I implemented a page footer that appears on every page the end user can view, this footer was not created on the initial wireframes as it was never considered. I believe the footer that I have implemented is an excellent addition which boosts the productivity and professionalism of the companies official Traveller System which also follows the colour scheme that MEP Technologies uses in its logos. The footer contains an about us section for the company followed by essential social media platform links that the end user and or clients can view if they manage to get onto the System Access Portal.
3. Additionally, with the Traveller Templates section, the initial wireframe held a green button for submitting the traveller to the database, this was to be in line with Jakob Nielsens 10 Heuristics of Usability specifically #4 Consistency & Standards “Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform and industry conventions.” (Nielsen, 2025) in which went through different design choices by its phases of colour. Initially it was Green like its wireframe, it was then changed to be blue like the rest of the user interface to ensure all content is labelled and coloured similar to avoid confusion then the final build of the page had the button red to follow the MEP Technologies colour scheme.
4. In the middle of development whilst trying to follow the wireframes, I decided to remove the Traveller Templates page and opted to transfer its contents into a Dashboard which holds the Production Traveller Templates right on the main page of the system. This ensures that the end user can view the travellers straight from login which boosts usability. Whilst discussing with the client on this change near the end of development, the client liked the change and preferred it to its old, intended placement.
5. Within the Edit Traveller page, the original wireframe designs created in the planning phase included a confirmation screen in which would warn the end user before submitting a traveller to the database. This feature was not implemented in the development phase which does not follow the 3rd Rule of Jakob Nielsens 10 Heuristics User Control and Freedom, “Users often perform actions by mistake. They need a clearly marked "emergency exit" to leave the unwanted action without having to go through an extended process.” (Nielsen, 2025) Without this, the end user can accidentally submit a traveller to the database which could be frustrating and was completely overlooked in development.
6. Developing the project came with some roadblocks which took longer time to adapt to and complete than anticipated which in result gave me less time to implement a fully-fledged Traveller Revision system which would have updated the Traveller Templates section in the dashboard with the updated travellers. The updated versions could have added or removed fields connected to the specific traveller at the result of the Head of Production account. By the time of the deadline this feature was removed to focus on the last-minute finishing touches for higher priority requirements.
7. By the end of development I had as many features implemented that I could within the timeframe and all time spent other than fixing bugs or issues with other implemented features, the implementation of a simple export data feature was not implemented which was one of the requested features asked for by the Head Of Production, although during testing I had a conversation with him and he was happy enough with the submitted travellers page holding the data that’s going through the database and may request in future that this feature is researched and implemented for ease of logging on the logistics end of the company.

# Skills and or Knowledge Retained from the Project

### Project Planning

The Graded Unit Project was a major step forward for me as a learner, it challenged me to plan, develop and test a large-scale project with strict development deadlines which encouraged me to step out of my comfort zone and submit a working finished project. Thinking more deeper, working with a client for a project was a major difference compared to other projects I have worked with which passed along skills such as communication and management skills which I will only continue to build upon.

### Project Testing

During the testing phase of the project, I followed the testing plan that I created during the planning phase which consisted of Usability Testing and Functionality Testing with methods of White Box and Black Box testing. These methods are familiar to me as I have used them in previous projects numerous times, and I am confident in using them effectively in any new project that I work on.

When conducting White Box testing, I organised a session with the Head of Production to have some staff from MEP Technologies to test the system against a series of tasks I have created to be rated on its difficulty of completion these staff members do have prior knowledge on the traveller system beforehand which is why I used White Box testing for this user group.

Black Box Testing was also run but with 2 Individuals who have no prior knowledge on the systems being used at the company to gain accurate results. This provided a real-world insight into how my system I created would be used in which I gained valuable feedback from the client and real end users which will contribute to my ongoing continual development as a software developer.

### Extended Workplace Knowledge

After completing this project which was a system created for a company called MEP Technologies, I previously had a minor background with the company helping out doing various tasks in the production line. After creating this system I now have an extended knowledge on the processes, ins and outs of the company and how the Travellers are created, stored and managed. This is extremely useful as it shows that I went through lengths to Research into the company, communicate with the staff, mostly the Head of Production which was the client and find out truly what they desperately need for a system. The skills taken from this include Communication, collaboration between me the developer and MEP Staff Members and problem solving which I will adapt and continue to improve upon.

### PHP Objects

Before this project, I had experience using and developing projects using PHP but never within an object-orientated environment. When working with PHP Objects it was a completely new area for me which I initial found troubling and hard to understand until I realised it was similar to past Java OOP Projects. Throughout the project the PHP Objects was used as a main structure to display and automate systems such as validating end user login, content display onto the page or even handling traveller sheets being uploaded to the database using POST Requests. This project helped me understand how to make use of object-orientated programming in a web application which I have really enjoyed learning about and look forward to advancing on these skills to future projects or ideas in my spare time.

### Supabase

In the early stages of the project I researched into a 3rd Party Library known as “Supabase” which is an open-source cloud-based Database platform which is built upon Postgres or also known as PostgreSQL. Supabase proved to be an interesting idea to implement into the project and early on I attempted to implement this into my project which in return did not go to plan, I could not get Supabase to work with my existing PHP Files and other project files. I feel if I did spend an extra day or two tinkering with Supabase I could have got it implemented, and I am still excited to look into it again in my free time to hopefully implement it into the project as a cloud-based alternative to my existing local database used in this project.

### PHPUnit

During the testing phase of my project I completed the required Functionality and Usability Testing as per my Testing Plan within the Planning Documentation. Afterwards, I attempted to perform Unit Testing on my web application and after some research time I came to a framework called PHPUnit which is installed via command line either in Windows PowerShell or within the Visual Studio Code Command Line. This process did not go entirely to plan as when following the instructed guide documentation on the PHPUnit Website I found that the installation was unsuccessful which resulted in my entire project being corrupted and rendered unusable. Luckily, I had created a restore point before implementing PHPUnit. A Lesson to have learnt from this process is that its important to create regular project backups before implementing anything major to a project in which I will ensure to do so in future projects.

# References

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