

Project proposal

Elevate Norfolk

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Activity A(i)

How hardware is used within the context of the construction industry:

IoT (Internet of Things): The IoT is a network of physical devices which can transfer data to one another without any human intervention. These devices are not limited to computers or machinery, this also includes sensors assigned a unique identifier. IoT helps the end users by being able to have several sensors which help track the weight that is placed upon any mobile lift which will proceed to give any warnings to the user if they are over or close to the maximum weight limit.

How software is used within the context of the construction industry:

Chatbots: Chat bots are computer programs that are designed to simulate human conversations over the internet. Chat bots help alleviate the wait time to contact with Elevate Norfolk whilst having 24/7 responses. The chatbot will mostly be answering simpler questions such as information relating to costs and max weight distribution on products as well as transportation of those products. An example of a website with a chatbot would be Peloton their

chatbot answers queries relating to purchasing equipment, fixing, or refunding already owned equipment, etc. <https://www.onepeloton.com>

Mobile Apps: Mobile apps are becoming more of a standard within the construction industry these apps would allow any user to browse the current selection of hireable goods that Elevate Norfolk will offer including details about the products and give the user the ability to hire any of the products or services including transporting them. You could also use the mobile app to track the current location of any equipment but have that information only available to employees.

Newly emerging technologies:

AI (Artificial Intelligence): Artificial intelligence also shortened to AI has recently become much more popular within our time since 2021 it has grown more than 30%. By using AI in the construction industry, it will make scheduling, planning, quality control and maintenance on machinery easier to perform and will overall benefit both the company and end users.

AR (Augmented Reality): AR also referred to as augmented reality is a recent technology that is increasing in popularity although it has not been used much it is a very good option to start thinking about. AR will allow all users to visualise any designs they have created from just Infront of themselves, an example of using AR in the construction industry would be from the company Trimble: Trimble offers a pair of Augmented Reality equipment that allows you to visualise, review and share 3D designs with a comprehensive suite of extended reality built for construction sites. <https://www.trimble.com/en/solutions/mixed-reality>

How digital solutions could be used to meet different user needs:

Digital systems are used by an end user which is either an employee or a member of the public, these users will have basic expectations of the system which are their needs which is what they want the system to do these needs will be

Appropriate & Effective Functionality: For a product to do well it needs to work well and provide the features we require to perform tasks. Technology makes it easier to get feedback from any user who has used our product or service which this feedback will help make improvements and changes to ensure the functionality is improved and meets more of the user's needs. Such as a company will wish to keep recordings of their finances, which can be done using an appropriate accounting software. <https://www.knowitallninja.com/dashboard/lessons/user-needs-characteristics/>

Accessibility Considerations: Digital technology has made it much easier for people with disabilities to access information, products, and services. Such as the use of text-to-speech software which can read aloud websites and documents for visually impaired people and screen readers can help people who are blind navigate around digital interfaces. Additionally many digital products and services have features that make them more accessible to people with different abilities, these would include a zoom function that makes text large and audio controls that allow people to adjust volume on videos.

<https://www.knowitallninja.com/dashboard/lessons/user-needs-characteristics/>

Compatibility: It is very important to consider compatibility when developing digital products since you are unsure if all features work on all devices and operating systems by considering compatibility, we can ensure that everyone enjoys the products. Digital technology has helped ensure compatibility by allowing developers to create products that work on various devices and operating systems. <https://www.knowitallninja.com/dashboard/lessons/user-needs-characteristics/>

Availability: The ability of an individual to access a product/service at any given time. Digital technology helps make sure that their products and services are available whenever and wherever people want them. Such as the use of online platforms like websites and cloud technology to make it easier for people to get what they need. OneDrive is a cloud storage server that lets you store files and allow you to access them anywhere.

<https://www.knowitallninja.com/dashboard/lessons/user-needs-characteristics/>
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Good User Experience: The overall experience an individual has when using a product or service, this requires the product to give an easy and enjoyable experience when used. Digital technology helps achieve this through personalisation by using algorithms and analytics we can understand. Other ways to help improve user experience is through simplifying tasks through automation providing clear feedback to understand what is wrong and right. <https://www.knowitallninja.com/dashboard/lessons/user-needs-characteristics/>

The industry-specific guidelines and regulations you will need to follow:

Computer Misuse Act 1990: Is the main legislation that criminalises unauthorised access to computer systems and data and damaging or destroying these. Access is defined in the function as:

- Altering or erasing the computer programme or data
- Copying or moving the programme or data
- Using the programme or data
- Outputting the programme or data from the computer in which it is held (whether by having it displayed or in any other manner) <https://www.gov.uk/government/consultations/review-of-the-computer-misuse-act-1990/review-of-the-computer-misuse-act-1990-consultation-and-response-to-call-for-information-accessible>

The Data Protection Act 2018 (GDPR): Everyone responsible for using personal data must follow strict rules called 'data protection principles. They must make sure the information is:

- Used fairly, lawfully, and transparently.
- Used for specified, explicit purposes.
- Used in a way that is adequate, relevant, and limited to only what is necessary.
- Accurate and, where necessary, kept up to date.

- Kept for no longer than is necessary. https://www.gov.uk/data-protection?_ga=2.24080698.1252491626.1732892747-1400196952.1732892747

Copyright, Designs and Patents Act: This law exists to protect our creations.

When anyone creates something, they own it which includes:

- A picture, drawing or photograph
- A video, television programme or film
- Text, such as a book, article, or report
- A game

Unless you have permission to copyrighted material it is illegal to:

- Make copies
- Sell copies
- Publish
- Distribute <https://www.bbc.co.uk/bitesize/guides/zcxdxg8/revision/3>

Consumer Rights Act 2015: The consumer rights act came into force on the 1st of October 2015 this law ended up changes covering:

- What should happen when goods are faulty.
 - Unfair terms in a contract.
 - What happens when a business is acting a way which is not competitive.
 - Written notice for routine inspections to be given by public enforcers, such as Trading Standards.
 - How services should match up to what has been agreed.
- <https://www.gov.uk/government/publications/consumer-rights-act-2015/consumer-rights-act-2015>

LOLER (Lifting Operations and Lifting Equipment Regulations): These regulations are for people or companies who own, operator or have control over lifting equipment. LOLER requires that all equipment used is fit for purpose and is appropriate for the task. If your business undertakes lifting operations or provides lifting equipment for other's use, you should:

- Plan them properly
- Use people who are sufficiently competent.
- supervise them appropriately
- ensure that they are conducted in a safe manner

As well all lifting equipment including accessories must be clearly marked to indicate their "safe working loads" which is the maximum load the equipment can safely lift. The regulations also require employers to provide adequate information, instruction and training for employees who

use or supervise the use of lifting equipment. <https://www.hse.gov.uk/work-equipment-machinery/loler-overview.htm>

Activity A(ii)

In this task I will produce a detailed proposal for a digital solution that I will develop to meet the needs of the client and the existing and potential users. This will all be supported by my research in Activity A(i)

Business context

Elevate Norfolk is a new company which is being launched by Norfolk doors, which is based in Norwich. This company will specialise in the hiring of Elevated platforms (e.g. scissor lifts). The goal is to reduce reliance on external suppliers and provide direct service to businesses and individuals in need of platform rentals. The company would like to develop a strong brand identity, an engaging online presence, and an easy-to-use booking system to facilitate customers interaction and orders.

The project objectives set by the client (owner of Elevate Norfolk):

- **brand Development:** create a brand identity, including logo design, colour scheme, and overall visual language.
- **website Development:** design and develop a fully functional website for Elevate Norfolk.
- **platform Booking System:** allow users to browse available platforms, check costs, book rentals, and submit inquiries.
- **Clear Pricing Structure:** display transparent and easily accessible pricing information for various platform models, rental durations, and additional services.
- **Service Area Coverage:** communicate the geographical area served and any limitations (e.g., out-of-reach locations).
- **Contact Information & Inquiries:** ensure clear contact methods for potential clients, including phone, email, and a contact form.
- **Past Hires and Testimonials:** display successful past hires and client testimonials to build trust and credibility.
- **Technical requirements:** ensures the website is responsive, user-friendly, and mobile-optimised. Implement robust backend functionality to manage bookings, payments, and client communications.
- **Prototype & testing:** develop a prototype of the website for feedback, followed by testing and refinement based on client input.

The key performance indicators (KPIs) and user acceptance criteria for the solution

KPIs are the metrics that are used to assess the effectiveness, efficiency, and speed of the development of the solution. They can be used to change or make improvements with the process of the development of the solution and are an absolute necessity for software development. The KPIs are as follows:

- **Security:** the number of security issues there are and how secure the solution is.
- **Satisfaction:** used to assess the level of satisfaction of the user/customer.
- **Defects:** the number of defects in the software.
- **Number of bugs reported:** The number of bugs reported through the web application on a rolling monthly basis.
- **Uptime of the application:** The % of time that the application has been live on the web on a rolling monthly basis.
- **Number of new users of the web application:** The percentage increase of new users to the web application on a rolling monthly basis.
- **Number of new registered accounts on the web application:** The number of new accounts created on a rolling monthly basis.

User acceptance criteria for the proposed solution

User acceptance criteria are the conditions that must be satisfied for the solution to be accepted. For example, the user expects to be able to hire an Elevated platform from Elevate Norfolk. The user acceptance criteria is as follows:

- the solution provides customers with help and information about the Elevated Platforms.
- the customer can hire elevated platforms from them.
- customers can register an account.
- customers can manage their hirings when they have created their account.
- users can update their account details.
- Solution is mobile responsive so users on a wide range of devices are all able to access solution.
- Solution is easy to use, navigate, interpret and is accessible.
- Solution follows W3C WCAG 2 standards and conventions.
- Solution is compliant with all rules, guidelines, and regulations.
- User data is hashed securely, and the database is secure, so their data is safe.
- the solution has accessibility features to support a wide range of users.

The functional and Non-functional Requirements of the solution

The functional requirements:

The functional requirements are the requirements that are needed for the solution to function, without the functional requirements the solution would not be able to function at all. For

example, a functional requirement is to allow customers to hire an elevated platform from the company which is required for the solution to function.

The functional requirements are as follows:

- the solution provides customers with help and information about the Elevated Platforms.
- The customers can hire platforms from the company.

Non-functional requirements:

The non-functional requirements are the requirements that are not needed for the solution to function, but would preferably be implemented because they will enhance the quality of the solution. For example, a non-functional requirement is to allow registration so customers can manage their bookings which is not required in order for the solution to function but would be preferable to include as they can then manage their bookings which adds on functionality.

The non- functional requirements are as follows:

- The solution provides a way for customers to manage their hirings.
- The solution allows for customers to inquire about certain platforms.
- The solution allows a way for customers to contact the company.
- Customers can read about past hirings of certain platforms.
- Customers can register an account.
- The solution has accessibility features to support a wide range of users .
- Users can update their account details.
- Solution can load quickly under high amount of site users concurrently.
- data is hashed securely.
- SQL queries used placeholders to prevent injection attacks.
- Codebase follows PEP-8 standards and conventions.
- Codebase is modular, well commented and follows best programming conventions
- Codebase is easy to maintain, and client (RZA) can hire a third party to expand on the codebase.
- Solution follows W3C WCAG 2 standards and conventions.
- Solution is compliant with all rules, guidelines, and regulations.
- Solution is mobile responsive.
- Solution is easy to use, navigate, interpret and is accessible.

Decomposition of the problems that will need to be solved to implement the functional and non-functional requirements

The problems needed to implement the functional and the non-functional requirements of the solution can be decomposed into the following sections:

the solution provides customers with help and information about the Elevated Platforms: I will be creating a page which will show all of the Elevated Platforms which are offered by the company to rent out and these items will be in a card from bootstrap web framework with an image of the material and this will also provide customers with all the information they will need to understand each elevated platform and how they can be used and also any needed extra information they need they can contact the company to ask this will also be on the card.

The customers can hire platforms from the company and manage these hirings: on the same page which shows all the elevated platforms will have a hire here button. Once's the button is clicked it will take you to a page and ask you for when you would like to start hiring and when the end date to hire is also you will be asked if you need a driver to operate the equipment. After it will ask for your name, company name, way to contact and where you need this we will then look at the request to hire and if you are within the right distance for it to work then we will send a link to confirm whether you still want to hire and if you do we will ask for payment details. Once's hired it will appear on your user page and you can go on there and change any details you need to such as if you need to extend the end date to either be earlier or late.

Customers can create an account or update their account details: I will create a page where the user can create an account and then information added like email and password will then be hashed and inserted into an SQL database using parameters to prevent injection attacks with backend and front end verification to prevent any invalid values.

I will also create a page where the user can view their account details and they can update any of them so the values in the SQL database for their account will just be updated using the same verification and security features as was used when creating an account.

The solution has accessibility features to support a wide range of users: I will create a pop up page which will be accessible via the footer in the solution which will have:

- a translate function so the user can translate the language of the entire solution into any language they want by using the google translate widget API
- a font size slider to the user can change the font size of the page by sliding a circle up and down a slider
- a text to speech option will also be available.

The solution follows W3C WCAG 2 guidelines and other web standards and is easy to use, navigate and interpret: I will use other web development guidelines that I might come across to ensure the solution is easy to use, navigate and interpret. I will use these guidelines during development and frequently evaluate how well the solution meets these guidelines.

The solution is mobile responsive: I will use the bootstrap web framework templates which are mobile responsive and where bootstrap is not used I will use CSS media queries along with Firefox developer tools to make the solution mobile responsive.

Description of the proposed solution

The proposed solution will be a full stack website made with HTML, CSS, JavaScript, and Python. The back-end of the solution will be made using flask, the python micro web framework and the

database will be SQLITE 3 which is capable of storing up to 110 TB of data, which is very suitable for the client (Elevate Norfolk). Throughout the website, I will use the bootstrap web framework to get templates for the website. The solution will meet all of the functional and the non-functional requirements.

The solution will have an index page with a navigation bar at the top of the website and a footer at the bottom. The users will be able to get to whatever page they need to using the nav bar and there will be an admin portal located at the footer so admins can login or create an admin account. The accessibility popup will also be in the footer so the user is able to change their accessibility settings and the setting will be the same throughout the whole website. The website will have both front and back end verification to prevent any invalid input being inserted into the database.

All the content and information will be 100% reliable and accurate. The solution will also be mobile responsive using CSS media queries and bootstrap templates so the solution can be viewed on a wide range of devices.

The solution will be following all guidelines and regulations which have been researched during Activity A(i) and any additional ones discovered during the development of the solution. This will also include the compliance with web development standards such as W3C WCAG2 and the data protection act 2018. All-important data which gets inputted by the user will be hashed using the hashlib library built into python. The only data that will be inserted into the database is which is important and necessary to help protect the user and only the client (manager) will have access to the database. All SQL queries will use placeholders too to prevent injection attacks and prevent the user from directly injecting any harmful data into the database. All HTML forms that are submitted will also use the appropriate HTTP protocols such as GET and POST to prevent anyone intercepting the data when it is being transferred to the backend which also just adds on an extra layer of security.

There will be a page where the user can see all the platforms which are hireable and they will be set up using cards and will have all the information that you will need, and will only have the most reliable information. Also on this page if you are an admin you will be able to add new platforms which may be hireable and also remove any which you no longer allow to be hired. Each card will have a picture of the platform, a small detailed paragraph about the platform and then a button which you can click to find out more information about it.

If the user clicks the more information button you will then be able to see a hire here button, once's the button is clicked it will take you to a page and ask you for when you would like to start hiring and when the end date to hire is also you will be asked if you need a driver to operate the equipment. After it will ask for your name, company name, way to contact and where you need this we will then look at the request to hire and if you are within the right distance for it to work then we will send a link to confirm whether you still want to hire and if you do we will ask for payment details.

There will be a user login page, a user register page, an admin page, and an admin register page. You will only be able to get into anything to do with admin login or register if you have a code giving to you by the company.

There will be an account page as well where the user can update their details and also view there details.

During the development of the solution I will be using the Agile software development methodology where I implement a feature/functional or non-functional requirement and then fully test all of the inputs and outputs with valid, invalid and extreme data to ensure that the feature is fully functional and validates data to prevent any invalid data being inserted. I will only move onto the implementation of the next feature/functional or non-functional requirement when I have fully tested the previous feature and it has passed all tests successfully. The reason for me using the Agile method over an alternative like Waterfall where all tests are performed at the end of the development is because I believe this allows for greater flexibility, takes less time, enables me to perform more thorough testing and is more suitable.

Justification of:

I will divide the justification of the proposed solution into three parts.

How the recommended solution meets the needs of the client and the users

The recommended solution will meet the needs of the clients as it will include all the functional and non-functional requirements. This will ensure that their needs are met but also the solution will have admins which will enable for the client to be able to consistently add new hireable equipment without having to pay any third party to add the extra materials statically with just HTML. It will also meet the needs because all of the users private and personal data will be hashed, use secure HTTP protocols and use placeholders in SQL queries to prevent injection attacks.

The codebase will include comments and use appropriate naming conventions as well as following PEP 8 standards and conventions. This will also mean that the recommended solution meets the needs of the client as they can hire a third party to either carry out maintenance on the solution if needed or they can see if they can expand the solution because it has been coded well.

the recommended solution will also meet the needs of the user since the user will be able to create an account which will allow them to manage their bookings, the solution will also have accessibility settings which enable a much wider and diverse range of users to be able to easily use the solution. The users data will be hashed without any employee having access to their details and their data will be handled securely and appropriately using HTTP protocols such as GET and POST as well to ensure secure transmission of their data. The solution will also follow W3C WCAG and other relevant W3C guidelines to ensure the solution can be easily understood, navigated and interpreted.

How potential risks will be mitigated

The potential risks can be divided into the following parts:

Coding the solution

- not enough time: the solution should be done ahead of time and there will be a certain amount of time for each feature to be implemented and the testing of the feature. If I run out of time which has been allocated to that feature then I will come back to it if there is any time left.

- Errors in the codebase/solution: as mentioned before, I will be using the Agile software development methodology to test a feature/functional or non-functional requirement before moving onto the next one (unless I run out of time as mentioned directly above) with all possible inputs and outputs using valid, invalid and extreme data which will help to prevent against all errors in the codebase/solution.
- Not enough knowledge: I will be using bootstrap web framework for bootstrap templates which will help to make the front-end look better. And if I do not know how to do something then I will use the internet to try and help me make it.

Accessibility

- Solution only being in English: I will use google translate API so the user can translate the solution to whichever language needed.
- Solution not following web standards: I will use W3C WCAG and other guidelines to ensure that the solution follows web standards.
- Solution not being accessible to assistive technologies: I will use HTML alt tags on images to ensure that the whole solution can be read and accessed by a screen reader.
- User can't read font size: I will add a way for the user to change the font size.

The solutions compliance with rules and regulations in relation to the software development sector and the tourism and leisure sector:

- Solution not compliant with rules and regulations: using research done already I will ensure that the solution complies with the rules and regulations during the development of the solution.
- Handling of user data: all user data will be hashed and there won't be a way for it to be un-hashed meaning that no one who is looking to database will be able to decrypt the data, and only the client (manager) will be able to access the database.

How relevant regulatory guidelines and legal requirements in relation to software development and the tourism and leisure sector will be addressed

I will address all relevant regulatory guidelines and legal requirements by frequently analysing the recommended solution to ensure that they have been addressed. If I find that it hasn't been addressed then I will change the solution to make sure it has. This means following W3C guidelines along with legal requirements such as the data protection act 2018 meaning all data will be hashed securely and only the relevant data will be kept for as long as necessary.