

Initial Plan:

CNI 2D Digital Demonstrator:
Showcasing why we need to secure industrial systems

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Project Overview

This project is to create a digital demonstrator of critical national infrastructure (CNI) that can display what would happen in the case of a cyber-attack. The CNI lab in Abacws already has a physical demonstrator for CNI however this project is focused on creating a digital version of this.

The motivation to complete the project is to allow users to demonstrate to people with little to no technical background the potential impacts of a cyber-attack on CNIs. CNI are vital to allow our nation to continue to function normally. If a CNI is unable to operate normally it can have massive social, health and political impacts. This will therefore allow them to understand the importance of securing our CNI against such attacks.

There are 14 sectors of CNI, and they are all interconnected. My focus for this project will be on the CNI related to transport and power. With the specific transport being the rail network.

Aims and Objectives

The main aim is to create a basic model of a CNI (Rail or Power) that demonstrates the CNI working in a normal capacity. The graphics of this model will have a low fidelity with the focus being on a functional model. It will allow interaction with the model to simulate a cyberattack. The model should react to the attack and demonstrate the consequences and cascading effects of it, showing how a small attack can cause a massive impact on the CNI sector and how the impacts of this attack cascade to other CNI sectors.

A secondary objective for this project would be to add additional CNI sectors to the model and allow interaction between the CNI to demonstrate how an attack may affect multiple CNI. This will help show in more detail the cascading effects of an attack on one section of CNI.

A tertiary objective would include higher fidelity graphics for the demonstrator to improve the user experience.

One risk of this is that I have little experience with graphics and their implementation which may make improving the graphics of the demonstrator difficult. My main mitigation of this is to focus on the design's usability and to design the demonstrator so that it would not be difficult to improve the graphics of the demonstrator.

Feasibility

I foresee no major feasibility issues with this project, however there are a few minor ones.

First, I plan to use Unity to create my demonstrator. Although Unity requires licensing, I see no issue with this as Unity offers a student plan which should fulfill all the requirements for this project. However, if Unity were to change its conditions this could impact my project.

Another potential minor feasibility issue is if my computer were to become unusable during my project. This would leave me in a situation where I would be unable to complete any of the unity development for my project as I have no other device capable of completing this. The way in which I can mitigate this is to use repositories for my code e.g., git so none of my progress is lost and have informed my supervisor who has let me know that they have access to the device I could use for my project if needed.

Work Plan



Initial Plan

I plan to use Unity to create my demonstrator. Although Unity requires licensing, I see no issue with this as Unity offers a student plan which should fulfill all the requirements for this project.

The activity's initial plan consists of me creating this report that is a rough guideline for what I plan to do and how I plan to do it for this project.

Literature Review

For the literature review, I will identify research into demonstrators and choose a research document to analyse and identify its strengths and weaknesses. I will then use this innovation to help guide me further through my creation of a digital demonstrator.

Background Research

For the background research of my project will be looking at several different areas. These include models (such as the Welsh Rail network) to base my demonstrator on, the best way to show cascading effects in my CNI demonstrator and identifying ways to ensure that my demonstrator shows why we need to secure our CNI systems.

Design

The design section of my project will consist of designing and planning the solution to my project. This will consist of creating design models for my project as well as models for my code structure. I currently plan to program using an object-oriented method which should allow for easy future development. I will also at this stage find suitable sprites to use in the development stage.

Development

I have broken down the development section of my plan into three subsections:

The first part is the basic model. The current plan for this is to create a model of a part of the Welsh rail network consisting of stations and trains that take specific routes.

The second part of my development is to model the effects of a cyber-attack on my model. My plan for this is to show what would happen if a station or junction in the rail network was caused to be changed or become inaccessible for trains to move around as certain trains on my model would have specific purposes (E.G. freight) this would have cascading effects on other parts of the models such as power plants not receiving film materials they require.

The last part of my development section is to test and refine my demonstrator. This will require me to check over what I have already completed to make sure it works in the way that I have intended and if there are any issues fix and resolve them if I am unable to identify many issues or I have spare time during this period I will try in improve my model further adding more detail to it.

Report Writing

For my report finalization this will include me reflecting on the results of my demonstrator and how it achieves its goal of showing the effects of an attack on the rail network and the cascading impacts throughout other sectors of CNI.