Specifications
Metro Network Journey Simulator v3 (MNJS)

Summary

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1 - Introduction

1.1 - Thales Hong Kong

Thales Ground Transportation Systems is a leading global provider of innovative solutions for urban mobility and transportation. Committed to enhancing the safety, efficiency, and sustainability of public transportation networks, Thales Ground Transportation Systems specializes in cutting-edge technologies and systems for railways, urban transit, and roadways.

Stéphane DUGUET from Thales GTS contacted the ESEO to propose Metro Network Journey Simulator v3, a simulator of metros network, as an end-of-studies project to a group of students from ESEO.

1.2 - Purpose of the document

This document serves as a comprehensive guide and framework for the successful completion of Metro Network Journey Simulator v3 (MNJS). The purpose of this project specification document is to define and outline the project's scope, objectives, requirements, and constraints. It is a crucial reference point that will align the project team, stakeholders, and all relevant parties toward a common goal.

Within these pages, you will find a detailed description of the project's purpose, its expected deliverables, the roles and responsibilities of team members, and the timeline for execution. This document will also specify the quality standards, resources required, and any regulatory or compliance considerations.

All stakeholders, project managers, and team members to thoroughly review and reference this document throughout the project lifecycle to ensure that we collectively achieve the desired outcomes.

Thank you for your commitment to the success of Metro Network Journey Simulator. Your dedication and collaboration will be instrumental in meeting our objectives and delivering a high-quality solution.

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2 - Simulator (Go program)

2.1 - Generate less uniforms data and being more realistic

❓ *Today, the simulation generates data with a random function which provides non-realistics results : it is too uniform.*

- Change the random function to provide more realistic results
- Upgrade the realism of the values generated by MNJS :
    - Populations
    - Visitors in the stations
    - Peaks of visitors

2.2 - Upgrade day profiles (week-end, holidays, weekday…)

❓ *Currently, there are day profiles (weekday, weekend day and public holidays) but no calendar.*

- Implementation of a calendar
- More accurate differences between weekdays, weekends and public holidays

2.3 - Add special events in the city

❓ *According to the need of the customer to propose scenarios, the MNJS v3 must be able to propose special scenarios and events.*

- Implements multiple scenarios runnable by the simulation
    - Sportive events
    - Cultural events
    - Protest
- These events must affect the traffic of the network in relevant places

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2.4 - Edit metro schedules

❓ *In MNJS v2, the schedules are uniform, and not editable easily by the customer. It has to be modified, allowing the user to choose the line's schedules, depending on the day and the hour.*

- The user should edit the schedules of the lines, and choose how many time last between two vehicles at a station
- The schedule should be unique for each line
- The schedule should change during the day (*for example one each 30 min at a moment of the day, or 5 at another moment*)

2.5 - Upgrade incidents

❓ *The customer indicated that the incidents had not been implemented correctly.*

Here is a list of incidents that have been implemented, and it is necessary to determine to what extent:

- Delay on a line
- Line closure
- Station closure
- peak in a station

2.6 - Night schedules (stop line, clear memory)

❓ *The current version of MNJS only allows the user to simulate a single day. However, the customer needs to simulate periods (see next point) that is why the night has to be part of the v3's development.*

- Stop the lines between two specific hours
- Implement a system to clear/optimize the memory between two days

2.7 - Manage periods (instead of a single day)

❓ *To make the simulations more realistic and to get more data, the customer wants to emulate periods of time of two days or more, instead of the current version which only allows to emulate one day.*

- Allow the user to emulate a period of 2 days or more
- The period should have different kinds of days such as week-end, weekday, etc.

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2.8 - Upgrade customer use and installation

❓ *For a non-dev user, the simulator needs to be easy to use and to install. This is the main purpose of this part.*

- Complete the documentation to make it user friendly
- Ease the installation of the simulator for a “normal user”
- Ease the use of the simulator for a “normal user”

3 - Scenario editor (Java)

3.1 - Fix current bugs on the Java program

❓ *When the team started to use the simulator, it was noticed noticed that it contains some bugs. The team aims to fix it during the development and add a (non-exhaustive) list of bugs to fix. During our work, it is possible to find new bugs, that is why the following list is not complete.*

- Fix the station merging
- Fix the simulation config save (on coordinates)
- Fix the elements position
    - Zones should be placed on the map and not on the user’s screen
- And more bugs which could be found later during the project development…

3.2 - Characterize populations, zones…

→ Linked to 2.1 (Simulator) **-** Generate less uniforms data and being more realistic

❓ *The simulator already provides to the user the ability to characterize some elements of the simulation, but it has to be developed and enhanced*

- Populations
    - Types of people (tourists, workers, students)
- Zones
    - Types of zones (commercial, residential, industrial)
- Stations
    - The stations should belong to a zone or to multiple zone
    - The stations should contain different types of populations

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3.3 - Upgrade HMI

❓ *According to the wish of the customer to make the simulator easier to use for a customer, he asked to upgrade the HMI to make it more intuitive, easier to understand and up to date.*

- Propose a new version of HMI including all the parameters of MNJS v2
- The new HMI has to be modular, to implement the ability to edit more elements (see the next points)

3.4 - Modify passengers quantity

❓ *To make the simulation more parameterizable, the Java program (to create simulation models) has to implement the ability to change the passengers quantity in various fields.*

- Change the passengers quantity in the whole simulation
- Change the passengers quantity and capacity in stations and trains

3.5 - Automatically launch the simulation when the scenario has been created

→ Linked to 2.8 (Simulator) **-** Upgrade customer use and installation

❓ *To improve the use of the simulator, the customer asked to ease the run of a simulation. This part concerns the execution of a simulation from the scenario creator (Java script) once the scenario is finished. Which means less manipulation for the user.*

- Once a scenario is created in the Java program, it should be launched directly from this interface
- The results of a run should be seen directly on the Java HMI in spreadsheet format

3.6 - Configuration of simulator manageable from the HMI

→ Linked to 2.8 (Simulator) **-** Upgrade customer use and installation

→ Linked to 2.7 (Simulator) **-** Manage periods (instead of a single day)

❓ *To improve the use of the simulator, the customer asked to ease the change of configuration in the simulator.*

- Propose a way to change the configuration of the simulator directly from the HMI

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- A plus would be to be able to save the configuration created and open an existing one

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