Final version of the adapted and localized NABBOVALDO game

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Abstract	This is the accompanying document of the D4.1 which consists of a software item, the final version of the adapted and localized NABBOVALDO game, complete with APIs for its integration into the gamification platform. This document gives an overview of the translation and localisation work, and details about the game itself.
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1   Introduction

This document accompanies the release of the localised English version of the game "Nabbovaldo and the Cyber Blackmail". The game was designed and developed in its original version in Italian by two of the partners of the SuperCyberKids project, CNR-IIT Pisa and GRIFO. The content, storyboard and graphical assets of the game were provided by CNR, while GRIFO acted as game developer.

"Nabbovaldo and the Cyber Blackmail" (in Italian: "Nabbovaldo e il ricatto dal Cyberspazio") is a single-player graphic adventure game with multiple-choice dialogues, alternated with puzzle and/or arcade-style minigames. The setting is Internetopoli, a city in which landscapes and characters feature the complexity of the Internet world.

Nabbovaldo is one of the two educational games, together with Spoofy, provided by the partner CGI (see D4.2 "Final version of the adapted and localized SPOOFY game"), that will be integrated to support cybersecurity education in the SCK project. The games are aimed at children aged 8 to 13 years and are intended to be used both in schools and as stand-alone educational games.

The **Nabbovaldo game is available for free** in its two language versions, Italian and English **on Google Play (Android version) and on App Store (iOS version)** (search for "Nabbovaldo").

In this document we will provide an overview of the game, describe the sections in which it is structured and how the player can proceed through the mechanics of the game. We will then explain how the localisation and translation work occurred, and then give a list of the APIs that accompany the game to make it communicate with the SCK gamification platform (see Deliverable 5.1 "Gamification platform and back-end tools").

A description of the game taking into account the cybersecurity competences it helps to develop and acquire can be found in the internal report 4.1.1 "Implementation of the competence-based analysis of applied games for cybersecurity education".

2   Nabbovaldo

2.1   Background: the "Ludoteca del Registro .it" project and Nabbovaldo

Nabbovaldo is a video game designed, developed and promoted in the framework of a project implemented by the Ludoteca del Registro .it.

Registro .it is the registry of Italian Internet domains, and works within the CNR-IIT (Institute for Informatics and Telematics). The Ludoteca project, sponsored by the Italian Authority for Children and Adolescents, promotes the Internet culture across educational establishments of all types and at all levels. Specifically, the Cybersecurity Labs of Ludoteca del Registro .it aim at encouraging a more knowledgeable and safer use of the Internet by young people. To this purpose, the Ludoteca has collected a set of content and tools such as a web app, cartoons, comics, quizzes, freely offered to schools.

All the content designed for primary and secondary schools are set in a fictional city called "Internetopoli", which intends to reproduce the world of the Internet. The main character is a young

man called Nabbovaldo, inspired by the character Marcovaldo in a famous book by the Italian writer Italo Calvino, "Marcovaldo ovvero Le stagioni in città", where Marcovaldo is an inexperienced guy who must face the challenges and the opportunities offered by an unknown metropolis in the Sixties. In Internetopoli Nabbovaldo is an ordinary but naïve teenager who loves IT and technology, but unfortunately - according to his name "nabbo", namely "foolish" in online jargon - is not aware of the risks of the Internet.

Two comic books featuring Nabbovaldo were designed as part of the workshops on IT security offered by the Ludoteca to several schools. Subsequently, this recreational and educational approach led to the creation of a videogame with the same characters and setting, Nabbovaldo and his friends, and Internetopoli.

2.2 The videogame "Nabbovaldo and the Cyber Blackmail"

Figure 1: Nabbovaldo game title page

The videogame "Nabbovaldo and the Cyber Blackmail" (in Italian: "Nabbovaldo e il ricatto dal cyberspazio") is aimed at children aged 11-14 to improve their knowledge related to the use of digital resources, and encourage the adoption of good practice. It is a single-player game that can be used both in the classroom, as reinforcement for the teacher's lectures, and by kids on their own as a self-consistent game.

The game has a hybrid structure: players can either follow a fixed path, or move freely along the map, talk to characters and play the mini-games in any order. The setting is Internetopoli, a city in which landscapes and characters feature the complexity of the Internet world.

In this videogame, Nabbovaldo faces the IT threats of Internetopoli; to advance in this challenge and win the game, he will have to perform a series of actions and go through several minigames. The videogame also features new characters who help Nabbovaldo in his quest and have a functional role in the game.

2.3 The gameplay

The game is structured around four components:

- the SETTINGS: the various scenes where Nabbovaldo explores the city (such as, for example, Nabbovaldo's home, the Social Club, Freddy's Ice Cream Parlour, the Central Square, Linda's home, Ted Tuber's home, the Police Station etc.)

- the MAP of Internetopoli

- DIALOGUES

- MINIGAMES.

During the gameplay, the player constantly moves across the sections of the fictional city of Internetopoli, and is involved with Nabbovaldo in dialogues with several other characters.

When moving across the Settings (both inside and outside), the player can use a Map to know Nabbo's geolocalisation. The Map also features several icons showing where the game quests and objectives are (minigames and/or quests connected to the main plot).

Figure 2: map of Internetopoli

When a player taps on a Setting, the Map closes automatically, and he/she is directed to the selected Setting.
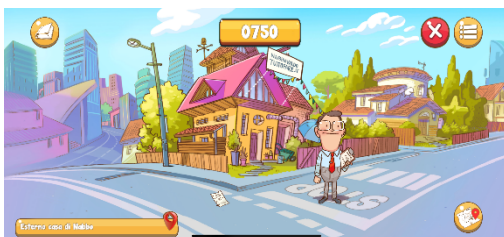

Figure 3: example of setting: Nabbo's home, exterior

Figure 4: example of setting: Nabbo's home, interior

When entering the Settings, the player activates a series of dialogues between Nabbovaldo and other characters. They usually introduce concepts and definitions related to cybersecurity good practices. Some of these dialogues may require a choice at the end, acting as a sort of multiple-choice quiz.

Figure 5: example of dialogue with final multiple-choice quiz

The players are involved in exciting scenarios that change according to the challenges to overcome, all of which are divided into levels. They can move freely around the map, talk to the characters, and solve the minigames in the order they prefer, but the game's plot revolves around four main chapters, plus an epilogue in which the player can only perform a final dialogue.

When the player has gone through all the minigames and objectives of a chapter, they move on to the next chapter. The minigames also allow for a reset of the game world between different chapters. In fact, the chapters are visually divided by short movies that describe the developments of the main plot.

The game also features a section called NABBOPEDIA, which is a small dictionary collecting definitions of the technical terms on cybersecurity. The player can access this dictionary at any time.
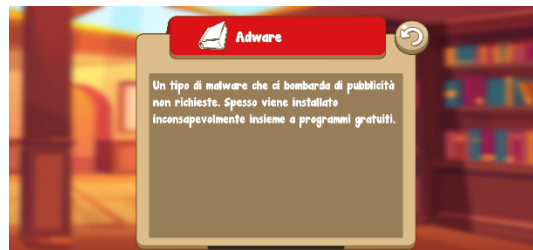

Figure 6: example of an entry in the Nabbopedia

As for the ranking system, the points are called "likes" and feature the classic thumbs-up icon. The player can earn points by:

- Playing mini-games
- Providing the correct answer to a multiple-choice dialogue
- Collecting the Nabbopedia pages scattered in the game Settings
- Reading the definitions written in the Nabbopedia.

The player loses points by:

- Providing the wrong answer to a multiple-choice dialogue
- Playing the "Slot Machine" game more than once.

The game progress can be saved, so that players opening the game at subsequent times can start off where they left. At the end of the game the player is ranked according to the number of likes collected during the game.

2.4 Minigames in Nabbovaldo

There are 9 minigames (8 games plus one, see explanation below) included in Nabbovaldo, linked to some specific settings. The player can play a minigame to score points and advance in the adventure.

Here is a description of the minigames.

1. **Virus Clean-up**: viruses attacked the hard disk of an inhabitant of Internetopoli. The player must detect the memory blocks contaminated (the red ones) and hit them with the ball to save the uncontaminated ones.
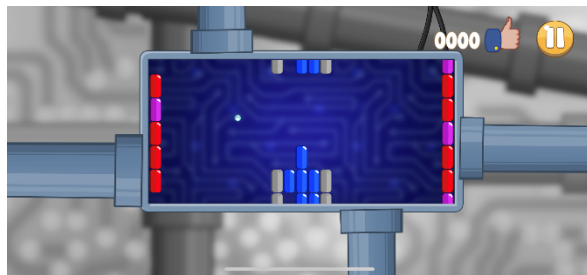

Figure 7: Virus Clean-up

2. **Whack a Worm**: worm viruses have invaded the garden of somebody in Internetopoli. The player must whack these worms, which are also able to replicate.
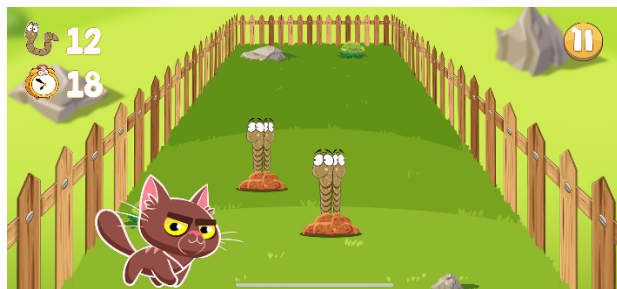

Figure 8: Whack a Worm

3. Adware Attack: Nabbovaldo is attacked by a group of Adware. The player must "swipe" them before they get too close. When the Adware touches the player, it splits into other ad windows that prevent the player from seeing the screen. To avoid this, the player must close promptly the windows by clicking on the "X".
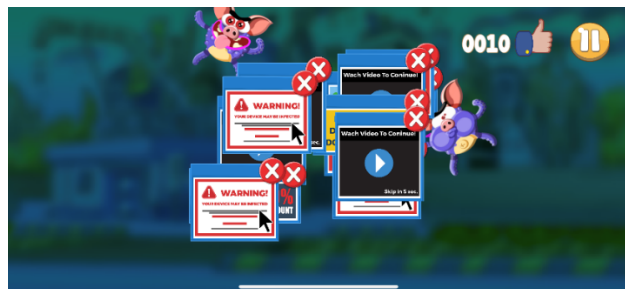

Figure 9: Adware Attack

4. Installation: Nabbovaldo is required to install an IT system. The player will have to fit elements (monitor, computer, printer, UPS, NAS, etc.) of different sizes in a peculiar area and make sure they are placed in the correct order.

Figure 10: Installation

5. Pairing: Nabbovaldo needs to pair two Bluetooth devices. Buttons are displayed on the monitor that light up and make sounds in a particular sequence: the player must repeat the sequence by tapping on the buttons.

Figure 11: Pairing

6. Firewall: Nabbovaldo must watch the boxes which are transported on a conveyor belt and analysed by x-ray to detect those infected by a virus. To clean them up, he must use a sterilizer of the same colour of the virus.

Figure 12: Firewall

7. Entagled wires: Nabbovaldo must try to disentangle the mess of wires before they get unusable, by clicking on the red balls.
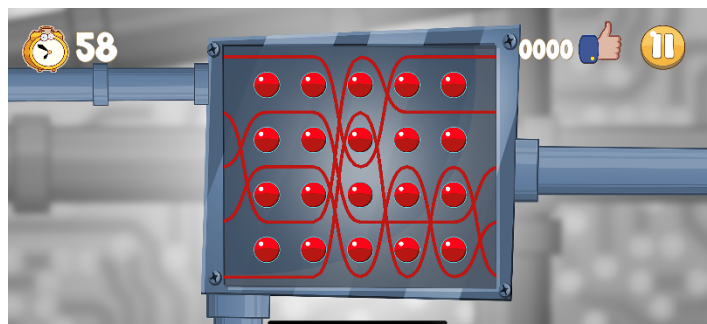

Figure 13: Entagled wires

8. Mail: Nabbovaldo must drag and drop in the correct order all the torn pieces that make up a letter on a sheet of paper.
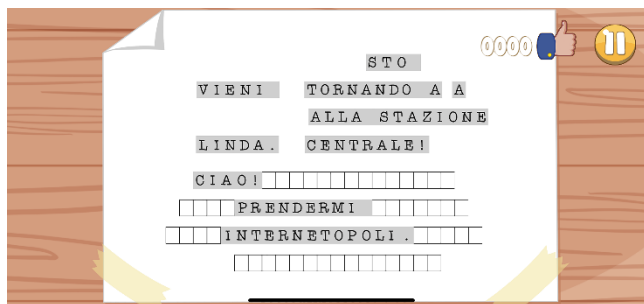

Figure 14: Mail

There is a ninth minigame in Nabbovaldo, the **Slot machine**: this is a fake minigame, because the player can earn points *only the first time* they play. If they continue, they will lose points. The purpose is the show the risks of gambling.

3   The localisation work

The localisation into English has been carried out under the supervision of CNR-IIT Pisa, the partner responsible for the design of the game in its original Italian version. The file containing the new text in English and the images with text have then been integrated in the structure of the game by GRIFO, the technical game developer responsible for producing the game in Italian.

GRIFO provided CNR-ITD with two files:

- a source code in CSV format where all content in Italian relating to labels in the user interface, instructions and entries in the Nabbopedia was available in table format. A new column "ENG" was specifically devoted to the translation into English, so that content in both languages was easily retrievable and ready to be placed in its appropriate space in the software.

- A JSON file containing the text of the dialogues, to be translated putting the translation directly in the source code.

There were no issues about localisation to be solved during the translation work. The world of Internet and its features are so globally consistent and well-known among the target population of kids that the translation team found no noticeable differences when translating items or names taken from the Internet from Italian into English. For example, "meme factory", "Ted Tuber", "Doctor Kapersky" were maintained the same over the two languages because they are specific to the Internet world, not to the Italian language only. There were puns intended with YouTube, the commercial internet security software Kaspersky etc. Even the main character, Nabbovaldo, which in Italian has a slight meaning of naïve, has been kept in English because of the sound of it.

4 The APIs accompanying the game

In addition to the localisation of the Nabbovaldo game in English, GRIFO has worked also to implement the communication via simple API interfaces between the game and the back-end of the gamification platform that is currently being developed in T5.2 (it will be delivered as D5.1 "Gamification platform and back-end tools").

These REST APIs are designed to monitor and track interaction with external games from the learning and gamification platform developed for the Super Cyber Kids project.

The APIs accept and return data in JSON format, ensuring interoperability and integration with external systems, providing a simple and scalable interface for integrating game monitoring and tracking functionalities.

4.1 Base URL

The base URL for accessing our APIs is currently provisional on the development platform:

https://nabbovaldo.grifomultimedia.eu/v1

4.2 Start or Continue a Game Session

Endpoint

POST /games/session

Description

This API tracks the start of a new game session for a specific game. The game must provide a unique gameCode that represents the game and will be communicated by the platform managers, a UUID generated by the game representing a game session, and the language selected by the user. It should be called at the start of a new game session or when resuming a saved game.

Request

STRING – gameCode, Game code.

STRING – UUID, Unique identifier of the user.

STRING – language, Language selected by the player.

Request example (JSON)

```
{
  "gameCode": "nabboblackmail",
  "uuid": "550e8400-e29b-41d4-a716-446655440000",
  "language": "it"
}
```

Answer

- **200 OK**: ok.
- **400 Bad Request**: invalid data sent.
- **404 Not Found**: resource not found.
- **422 Unprocessable Entity**: processing exception.

4.3 Track the Duration of a Game Session

Endpoint

POST /games/session

Description

This API is designed to be called at specific intervals and is used to roughly track the duration of a game session. It checks the active status of a client in an existing game. You need to provide the UUID of the session generated at the start and the game code.

Request

STRING – gameCode, Game code.

STRING – UUID, Unique identifier of the session.

Request example (JSON)

```
{
  "gameCode": "nabboblackmail",
  "uuid": "550e8400-e29b-41d4-a716-446655440000"
}
```

Answer

- **200 OK**: ok.
- **400 Bad Request**: invalid data sent.
- **404 Not Found**: resource not found.
- **422 Unprocessable Entity**: processing exception.

4.4 Submit the answer selected by a user for a question

Endpoint

POST /games/questionAnswer

Description

If the game includes questionnaires or quizzes, this API enables to track the question and the answer selected by the user. It should be called when the user selects an answer. The following elements are needed: numeric question index, the question text (preferably in English even if the user views the question in a different language), the numeric answer index, the answer text (preferably in English even if the user views it in a different language), the question topic, the session UUID generated when the game started, and the game code.

Request

INT	**-**	**questionIndex,**	**Question**		**index.**
STRING	**–**	**questionText,**	**Question**		**text.**
INT	**–**	**answerIndex,**	**Answer**		**index.**
STRING	**–**	**answerText,**	**Answer**		**text,**
BOOL	**–**	**isCorrect,**	**True**	**or**	**false**
STRING	**–**	**topic,**	**Question**		**topic.**
STRING	**–**	**gameCode,**	**Game**		**code.**

STRING – UUID, Unique identifier of the session

Request example (JSON)

```json
{
    "questionIndex": 1,
    "questionText": "Who was the first president of the United States?",
    "answerIndex": 2,
    "answerText": "George Washington",
    "isCorrect": true,
    "topic": "USA story",
    "gameCode": "nabboblackmail",
    "uuid": "550e8400-e29b-41d4-a716-446655440000"
}
```

Answer

- **200 OK:** ok.
- **400 Bad Request:** invalid data sent.
- **404 Not Found:** resource not found.
- **422 Unprocessable Entity:** processing exception.

4.5 Authentication

To access these APIs, a Bearer authentication token is required. This token must be included in the request header as follows:

Authorization: Bearer <your-token>