

IO3 – A1:

TECHNICAL SPECIFICATIONS OF THE 3D VIRTUAL PLATFORM

ISSA PROJECT

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1. Introduction

1.1 ISSA Project

"ISSA, Internationalisation for Social and Innovative Start Ups and Entrepreneurs" is designed to identify core and innovative learning methods that encourage success in international activities for social start-ups and entrepreneurs. The impact of the global financial crisis has made it necessary to look for an innovative vision on how to improve economic growth; one of the most attractive options are social entrepreneurs. Although social enterprises are a mean to increase competitiveness and state the importance of cross-border values on European economy, it should be noted by social entrepreneurs how nowadays organizations active on international markets grow faster and are more innovative than those that limit their activities locally. Due to their social activity, it is highly interesting for social enterprises to initiate international relations with similar organisations to promote their objectives at European level (EC, 2015).

ISSA's participating organisations will carry out a project which focuses on the improving the internationalisation perspectives of EU's Social Start-Ups. The essential goal of this project is to analyse the most frequent Social Start-Ups problems and barriers in effective internationalisation process and meet these challenges. During the project, ISSA will deliver self-training and practical internationalisation and entrepreneurial education among social entrepreneurs from the partner's countries. The project will design an innovative self-training course for the internationalisation of social start-ups that will serve as guide to solve the special needs of social start-ups and entrepreneurs to get proper training in essential aspects of the internationalisation process, through the cooperation of the partners. The self-training course will be complemented with an e-learning platform that will work as support for social entrepreneurs. ISSA will provide and support a proper Virtual Environment to promote social entrepreneurs attitude about the vital importance of internationalisation of the social start-up in early stages.

ISSA's main objectives are focused on developing quality and practical Life Long Learning support, with a strategic use of information and communication technologies (ICT). The project's main target group is social entrepreneurs and potential social entrepreneurs interested in boosting social entrepreneurship and development of social start-ups.

1.2 About this Document

This document presents the technical specifications of the ISSA 3D Virtual World Platform that will be developed in OpenSim

In particular, it provides a short description of the key characteristic of OpenSim as well as the technical characteristic of the produced learning scenarios (from IO1) that will be implemented in the 3DVW Platform.

2 ISSA 3D Virtual World Platform and ISSA Moodle

ISSA 3D Virtual World Platform will be the learning environment, in where users will be able to test their gained knowledge from ISSA Moodle modules (IO1 &IO2) by implementing the ISSA Learning scenarios (IO1)

The initial purpose of ISSA project was to interconnect ISSA Moodle with ISSA 3DWV Learning Platform through the use of SLOODLE (a dynamic learning environment which links 3D virtual environment to an open learning source like Moodle)

However, it was revealed that the currently available version of SLOODLE is quite old and it cannot be intergraded with the current version of Moodle. Using older versions of both SLOODLE and Moodle was considered but was not adopted because of security problems due to known vulnerabilities leaving the platforms exposed to attacks.

2.1 Applied Solutions for the Interconnection of ISSA 3DVW Platform with ISSA Moodle

In collaboration with UCY the following solutions will be applied so as to be in line with what we have said in the proposal

For Single sign in: the users will first register to Moodle and then they will create their avatars by using the same credentials with Moodle . The only change is that they will double write their username. The process is explained in the following sections of this document

For the interconnectivity with ISSA Moodle: Upon the completion of each scenario, users will receive a code. They will return to ISSA Moodle and they will paste the code in the respectively field and only then they can proceed with the self-evaluation questions.

3 ISSA 3D Virtual World Platform- As agreed

Based on the agreed solution with respect to the interconnectivity with ISSA Moodle, the sequence of steps will be:

As a first step, users will have studied the modules in ISSA Moodle

As a second step, they will be asked to move to ISSA 3D VW Platform in order to implement the related learning scenarios

As a third step the users will enter to the platform (using the same credentials as with ISSA Moodle) via their avatars and they will implement the scenarios using the offered services of OpenSim such as notifications cards etc. For each scenario they will implement they will receive a code in a form of badge

In fourth and final step, users will return to ISSA Moodle and they will use the received code in order to have aces to self-evaluation questionnaires of the related module

The next sessions present in brief the main characteristic and offered services of ISSA 3D VW Platform

3.1 Introduction to OpenSimulator

OpenSimulator (www.opensimulator.org), often referred to as OpenSim, is a free, open-source, 3D application server that allows the creation of 3D virtual worlds, where multiple users can simultaneously be present.

These virtual worlds can be accessed through various open source clients and can remain private, behind the firewalls, or become public.

OpenSimulator is written in C# and its framework is designed to be easily extensible through external modules.

The OpenSimulator project started in early 2007 as an open source server side to Linden Lab's Second Life open-source client. Consequently, Open Simulator's current architecture is heavily influenced by that of Second Life, allowing the user to produce from scratch similar highly detailed 3D graphical environments at low cost, or at no cost provided that the hardware/software and the building/scripting/technical skills are offered for free.

The avatars are fully customizable and resemble those of Second Life. The in-world communication is based on text communication tools (i.e. chat, IM). At the moment, a reliable choice for free voice service with lip sync is the one provided by Vivox Inc., after request.

An exceptional feature is Hypergrid, a protocol that allows hyper linking between OpenSim worlds and supports seamless avatar transfers among these worlds. Despite the fact that the platform has not reached a beta version yet, it proves to be quite stable and robust. The aforementioned reasons plus the freedom of owning, building and configuring the virtual world, have made OpenSimulator very popular among the educational and science community.

The following table includes some basic features of OpenSimulator

OpenSimulator

Architecture	Indicative Costs	Key Characteristics
<p>Client - Server</p> <p><u>Client (or 'viewer')</u>: open-source, multiplatform, free downloadable</p> <p><u>Opensim Server (v.0.7.6.1)</u>: open-source, multiplatform, free downloadable</p>	<ul style="list-style-type: none"> ▪ <u>'Region' (256x256m2)</u> (private, flexible, allows up to 15,000 prims): Free <p><u>Options:</u></p> <ol style="list-style-type: none"> 1. <u>Self-hosted virtual world on own server(s)</u>: Free (possible staff costs for system administration and configuration) 2. <u>Hosting on vendor server(s)</u> (dozens of vendors can offer hosting, consulting, design, development): Prices range from 15USD/month to 100USD/month 	<ul style="list-style-type: none"> ▪ Physics engine: OpenDynamics (ODE) ▪ Text and IM communication in-world. Voice not built-in. (voice service through external free modules: <i>Vivox, Freeswitch, Mumble</i>) ▪ In-world scripting: Linden Scripting Language (LSL), OpenSim Scripting Language (OSSL), C# ▪ Built-in 3D building tool ▪ Hypergrid protocol ▪ High quality fully customizable avatars ▪ Image, video, audio file upload (free) ▪ 3D COLLADA format

3.2 The ISSA 3D VW Platform Server

The ISSA 3D VW Platform server will be responsible for the maintenance and update of the virtual world status, managing every user and/or object applied alteration to the virtual environment state. For this reason, it is also called "simulator". Changes can come from many sources such as a direct response to user actions (e.g. avatar push an object), from scripts acting on an object or from environmental effects (e.g. simulated gravity). All processes related to the physics in the environment and the script execution is being handled by the simulator. Additionally, it responds to all clients' requests and can support the simulation of one or more fixed virtual world areas the so called "Regions".

The ISSA 3D VW Platform server will be hosted at CTI premises, but the open architecture allows expandability to further "Regions".

3.3 The ISSA 3D VW Platform clients

The client or "viewer" is the software responsible for the 3D graphical rendering of the avatars and the virtual world. Except during login, the client connects and interacts exclusively with the simulator(s) of the virtual world. A client connected to one Region of the virtual world is notified of simulation events occurring in neighbouring Regions, which allows the client to render a contiguous 3D environment that is not bounded by the resources of a single simulator.

The viewer acts mainly as an interface between the user and the simulator(s), offering tools for the client set up, landscape modification, avatar in-world customization, communication and movement, in-world 3D building, editing and scripting, file upload, social networking, etc. The quality of the graphics can vary a lot among different systems, depending mainly on the graphics adapter utilized.

3.3.1 Services

The backend of the system consists of the Services which provide the virtual world simulator(s) with the common resources requested. All the resources data elements are permanently stored in one or more databases under a unique ID which is called Universally Unique Identifier (UUID). In the classic architecture, access to these services always takes place via the simulator through well-known Uniform Resource Locators (URLs).

There are many Services offered by OpenSimulator, but the most crucial for the client-server communication are the following:

- User Service: This persistently stores user data, such as names, passwords and biographies and offers authenticity mechanisms during the initial user login to the virtual world.
- Grid service: The grid service keeps information regarding the coordinates and the positioning of every region in the virtual world. Simulators of other regions request this information in order to find out about their neighbouring regions.
- Asset service: This service stores all media data persistently. Discrete items of media data are called "assets" in OS terminology. Types of asset include textures, scripts, sounds, object representations etc.
- Inventory service: Each avatar owns an inventory in the virtual world which is similar to a personal warehouse with items (objects, scripts, textures, etc.) from the virtual world. Every item in this inventory holds references to a specific asset. The inventory service persistently stores this information.

3.3.2 Avatars

The client program enables users to interact with each other through Avatars (human shaped computer figures). A single user account may have only one avatar at a time, although the appearance of this avatar can change between as many different forms as the user wishes. Avatar forms, like almost everything else, can be created by the user with the use of a high-level interface. The avatar can be dressed up as the user desires, interact with other objects and avatars and even animate some physical movements of a user's choice.

3.3.3 Interactions

In OpenSimulator users can interact with objects, NPCs (non-player characters) and other users (avatars). There are three fundamental ways an avatar can interact with the surroundings:

- Touch (mouse left click)
- Notifications
- Chat

3.3.3.1 *Touch*

An avatar can touch objects and NPCs (click the left mouse button while pointing the object or NPC). The object/NPC may have a script to capture this touch event and thus trigger some appropriate action.

3.3.3.2 *Notifications*

Avatars can answer some system invoked notifications so as to state the corresponding user's preference or answer a simple multiple-choice question. These notification messages are sent by objects and NPCs and only a specified user can read them, usually the user that triggered the notification. Notifications are used through the game for questionnaires.

3.3.3.3 *Chat*

Chatting is a tractable event that can be used to interact with other avatars. Every avatar can chat in many different predefined chat channels. NPCs will use the chat channel to inform the player about the challenges they have to overcome in the game.

3.3.3.4 *Voice chat*

Apart from these build-in features, voice is also available therefore users can use their voice for communication but only with other users. While VoIP functionality is not a built-in feature, there are several external modules that can enable users to have voice chat in-world. However not all of them are able to offer realistic voice representation (i.e. lip sync, 3D sound etc.) and they require some extra system configuration. When the microphone button (red arrow) is pressed users' voice can be heard by everyone near them.

3.3.3.5 *Scripts and NPC*

An important feature of OS is the scripting which lies at the core of the platform's engine. OS script engine XEngine is responsible for the compilation of the scripts to .NET assembly before execution. OS currently supports LSL, OpenSim Scripting Language (OSSL) and C# scripts. These scripts can be written in-world and are embedded in the virtual objects, making them "alive", offering them capabilities like movement, communication, reaction to avatars' or other objects' actions, shape changing, etc.

NPCs are programs that can be used to control in-world avatar in an automated way. NPCs are perceived as virtual clients, so they do not overload the server as if they were real users' clients. For this reason, they can be as many as the simulation/game designer needs. Such functionality can prove extremely helpful when trying to implement scenarios where the users have to interact with NPCs. Bots can also be programmed to perform in-world maintenance or administration tasks. The OS platform offers numerous NPC-dedicated OSSL functions that can be applied to create scripts that control a Bot as desired.

To cover the ISSA project requirements, both the use of scripting language, as well as C# was used to create all the interaction features required for the scenarios.

4 Access to the ISSA 3D WV Platform

There are two basic steps that have to be done for accessing ISSA 3D WV Platform:

4.1 STEP 1 download and install a dedicated client

Since OpenSimulator does not come with a viewer in its distribution, in order to connect to the ISSA 3D VW Platform, a user needs to download and install locally one of the many compatible open-source viewers.

The available viewers differ in certain characteristics and users are free to choose their preferred one.

Detailed explanations about the downloading process as well as a list with suggested clients will be included in ISSA3D VW Platform's manual

4.2 STEP 2 create an avatar

In OpenSimulator the user registration process is an administrator task. The administrator of the OpenSimulator platform runs commands to register each user via the OpenSimulator server command line

This process is slow and inconvenient for large number of users. Instead we proposed the use of a different Distribution of OpenSimulator called Diva Distro that implements a web interface for user registration. When the user registers through this interface, changes are made directly to the database of OpenSimulator. The Web interface will be available on the ISSA website related section

The process is quite simple:

Users will enter the application and they will have to choose the option CREATE ACCOUNT

Then, they must fill the field:

- Name
- Surname
- Password

With the SAME username and password, they have chosen for ISSA Moodle

They can also choose the gender of their avatar (male, female or neutral)

A step-by- step guide for the creation of the avatars along with the related screenshots will be included in ISSA 3D VW Platform's manual

5 ISSA 3D VW Platform Entry point

5.1 - Welcome Area-Selection of Languages

When users log in to the 3DVW they will be redirected to the welcome area. In this area they will be treated with a collection of flags, each one corresponding to the 4 languages of ISSA partners (GR, NO, BG & ES) as well as EN) As a first step, they will select their language - flag, in order to receive the needed material and general guides in the language of their choice.

Users will have the option to choose their language only the first time they log in to OpenSimulator. Also, there will be available general information about the functionalities of OpenSim (i.e. how to move their avatars, where to find their inventory, how to use notification cards, etc) in a form of slide stand.

5.2 ISSA 3D VW Platform landscape

ISSA landscape will include the buildings for ISSA scenarios (4 buildings-each/scenario) as well as open areas decorated with trees, benches, rest areas, etc.

After the language selection users can freely explore the ISSA landscape and familiarize with the control of their avatar, the functions of the virtual environment and the UI of the viewer as long as they like. There will be a devoted area in where all needed information about the scenarios and the steps that users has to perform, will be displayed through banners with screenshots. The users will have to click them so as to receive the information in their selected language.

5.3 ISSA 3D VW Platform limitations

- Each room can be populated by a maximum of 5 users except for the Entry Point-Welcome area where can be as many as 10.
- Each scenario can be implemented by maximum 5 users at the same time
- Scenarios will consist of questions that the user must answer through the use of multiple choices questionnaires. References will be appeared after each question.
 - Due to the multilingual nature of the ISSA 3D VW Platform, and in order the OpenSimulator platform to operate in adequate speed, CTI will develop a script that implements a questionnaire in the VW using notifications. It's a collection of questions and each question has a set of predefined answers (multiple choices). The benefits of this approach are that the player will answer each question by choosing the number of the correct answer which will be the same for all the languages. Therefore, the evaluation of the input will be much easier on the system.
- When a user touches a predefined object, a questionnaire will start. Each interactive object can be used by one user at a time. Because of this limitation each questionnaire will have a time limit and if it's exceeded the user will have to start again from the start. Specifically, if a user touched an object and initiated a questionnaire every other user who touches the same object he will be

informed with a notification that the object is in use and he can try again after the first user finishes or the predefined time needed for this questionnaire has elapsed, whichever comes first.

- Users will interact with an object /NPC (BOTs) through dialogue boxes. In the dialogue box the text can be maximum 255 characters (it is standard type limitation of the OpenSim)
- Due to multilingual nature of ISSA 3D VW Platform, ALL interactions with object /NPC (BOTs) will be done by clicking them with the mouse. In this way each user will receive questionnaires/dialogue/ information in his/hr selected language

6 General information about ISSA Scenarios

- There are 4 scenarios and the duration of each scenario is 15 minutes
- Each scenario has a set of questions and in order to advance to the next scenario, all questions must be successfully answered. Every time users select the wrong answer, they will receive a related reference and they have to answer again until they find the correct answer
- Each scenario will be technically developed under the concept of the escape rooms, that is the users has to answer all the questions correctly in order to be able to leave the scenario room. This feature will additional integrate ISSA Moodle with ISSA 3D VW Platform since the user will be “forced” to finish each scenario related to the corresponding module so as to “escape” from the scenario room before proceeding with the rest scenarios. Note that the users can start by each scenario they prefer; there is no specific order of implementation of the scenarios. However, the users will have to finalize the selected scenario so as to receive the code which allows them to have access to the corresponding self-evaluation test in ISSA Moodle
- All correct answers will include the directions for the next step that users have to make
- When the users answer the last question –correctly- they will receive a code in a form of badge. User will be able to move from one scenario room to the landscape through teleporting. When a user touches a door, the door will not open, but the user will be instantly transferred to the other side of the door as if he had opened the door and passed through.

6.1 SCENARIO: CULTURAL AWARENESS

6.1.1 General description

This scenario will be implemented inside a coffee shop. In this scenario, user has to analyze the situation and the real meaning of cultural awareness and to gather a more realistic view of the situation

6.1.2 Technical implementation:

- ***Duration:*** 15 min

- *Type of questions*: multiple choices
- *Number of questions*: 5 questions
- *Number of BOTs/NPC*: 1 -the Bartender
- *Number of interactive objects*: 3: 1 table, 1 counter, 1 magazine

In front of the coffee shop there will be an informative kiosk with the main summary of the scenario as well as with the specific directions. Users will have to click it and the summary will be displayed as a notification card.

Upon entering the coffee shop, the user will be able to navigate the place before starting the implementation. The coffee shop will be equipped with tables, chairs, posters etc

In order to start the implementation, the user will have to perform the following steps:

Step1: Interaction with the Bartender/NPC. The user has to left click with the mouse on the bartender in order to receive directions about the question no 1

Step2: The user will have to touch a recommended table so as to receive question no1. Users have to find the correct answer which will include direction about the next step

Step3: The user will interact again with the Bartender so as to receive question no2. Users have to find the correct answer which will include direction about the next step

Step4: The user will have to touch a recommended counter so as to receive question no3. Users have to find the correct answer which will include direction about the next step

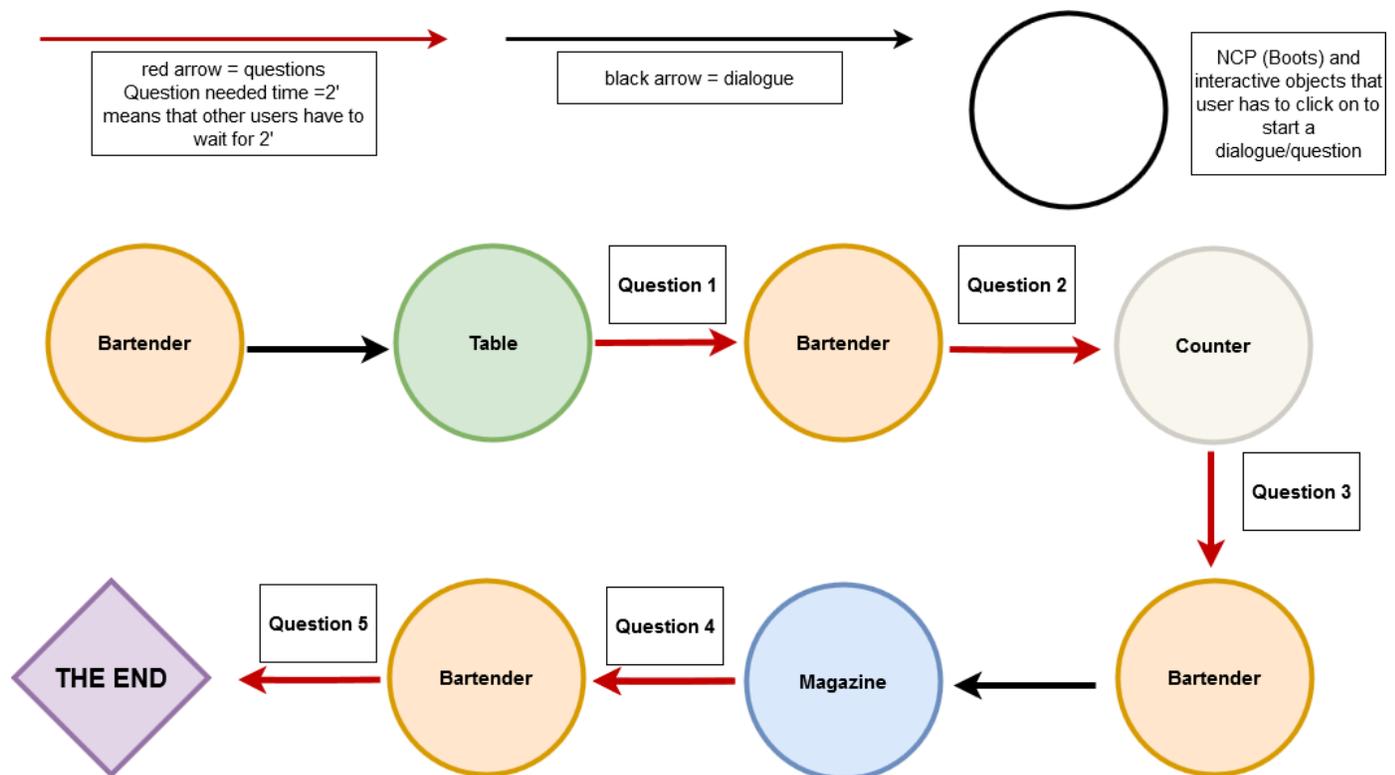
Step5: The user will interact again with the Bartender so as to receive directions about the question no 4.

Step6: The user will have to touch a recommended magazine so as to receive question no4. Users have to find the correct answer which will include direction about the next step

Step7: The user will interact again with the Bartender so as to receive question no5. Users have to find the correct answer which will include direction about the next step

Step8: END of the scenario. Users receive their code (in a form of badge which will be placed in their inventory) and they are teleporting outside of the building

The diagram representation of the technical implementation for this scenario is the following:



6.2 SCENARIO: MOBILISING RESOURCES

6.2.1 General description

This scenario will be implemented inside a company-like building. Here, users have to prove that they are aware of the resources they have, and which may be the best way of mobilizing said resources to get the most out of the internationalization experience.

6.2.2 Technical implementation:

- **Duration:** 15 min
- **Type of questions:** multiple choices
- **Number of questions:** 7 questions
- **Number of BOTs/NPC:** 1 -the Financial Manager
- **Number of interactive objects:** 7: 3 papers, 1 office-desk, 1 computer, 1 notebook, 1 phone

In front of the company-like building, there will be an informative kiosk with the main summary of the scenario as well as with the specific directions. Users will have to click it and the summary will be displayed as notification card

Upon entering the company-like building the user will be able to navigate the place before starting the implementation. The company-like building will be consisting of 2 rooms all equipped with desks, chairs laptops sofas etc

In order to start the implementation, the user will have to perform the following steps:

Step1: Interaction with the Financial Manager/NPC. The user has to left click with the mouse on the Financial Manager/NPC in order to receive directions

Step2: The user will have to touch a recommended office-desk and a document will be placed to his/her inventory he/she has to click it and read it

Step3: The user returns to financial manager so as to receive directions about the question no1

Step4: The user will have to touch a recommended paper (1 out of 3) so as to receive question no1. Users have to find the correct answer which will include direction about the next step

Step5: The user will have to touch a recommended paper (2 out of 3) so as to receive question no2. Users have to find the correct answer which will include direction about the next step

Step6: The user will have to touch a recommended paper (3 out of 3) so as to receive question no3. Users have to find the correct answer which will include direction about the next step

Step7: The user returns to financial manager so as to receive directions about the question no4

Step8: The user will have to touch a recommended computer so as to receive question no4. Users have to find the correct answer which will include direction about the next step

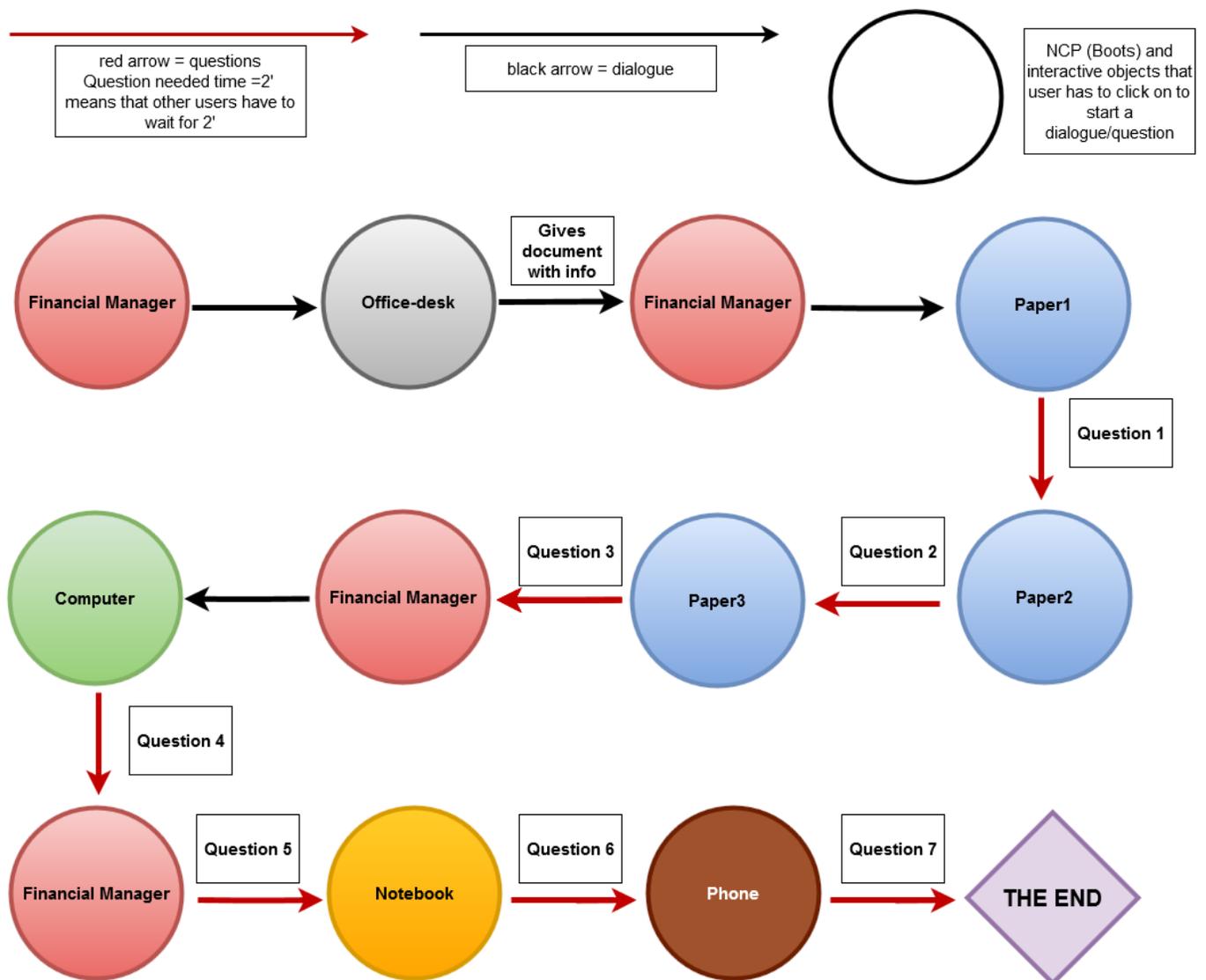
Step9: The user returns to financial manager so as to receive question no5. Users have to find the correct answer which will include direction about the next step

Step10: The user will have to touch a recommended notebook so as to receive question no6. Users have to find the correct answer which will include direction about the next step

Step11: The user will have to touch a recommended phone so as to receive question no7. Users have to find the correct answer which will include direction about the next step

Step12: END of the scenario. Users receive their code (in a form of badge which will be placed in their inventory) and they are teleporting outside of the building

The diagram representation of the technical implementation for this scenario is the following:



6.3 SCENARIO: IDENTIFY SOCIAL PROBLEMS

6.3.1 General description

This scenario will be implemented inside a company-like building. In this scenario, users have to answer questions dealing with social problems of different societies in different countries.

6.3.2 Technical implementation

- **Duration:** 15 min
- **Type of questions:** multiple choices
- **Number of questions:** 6 questions
- **Number of BOTs/NPC:** 1 -the Exports CEO
- **Number of interactive objects:** 7: 1 office-desk, 2 kiosks, 3 notebooks, 1 note

In front of the company-like building, there will be an informative kiosk with the main summary of the scenario as well as with the specific directions. Users will have to click it and the summary will be displayed as a notification card

Upon entering the company-like building the user will be able to navigate the place before starting the implementation. The company-like building will consist of 2 rooms and it will be equipped with desks, chairs, laptops, sofas, etc. BUT it will be different than the building of the scenario MOBILIZING RECOURSES

In order to start the implementation, the user will have to perform the following steps:

Step1: Interaction with the Exports CEO/NPC. The user has to left click with the mouse on the Exports CEO /NPC in order to receive question no1. Users have to find the correct answer which will include direction about the next step

Step2: the user continues interacting with Exports CEO/NPC and presses “next” to receive the question no2. Users have to find the correct answer which will include direction about the next step

Step3: The user touches a recommended kiosk and receives directions about question 3.

Step4: The user touches a recommended notebook (1 out of 3) so as to receive question no3. Users have to find the correct answer which will include direction about the next step

Step5: The user touches a recommended notebook (2 out of 3) so as to receive question no4. Users have to find the correct answer which will include direction about the next step

Step6: The user touches a recommended notebook (3 out of 3) so as to receive question no5. Users have to find the correct answer which will include direction about the next step

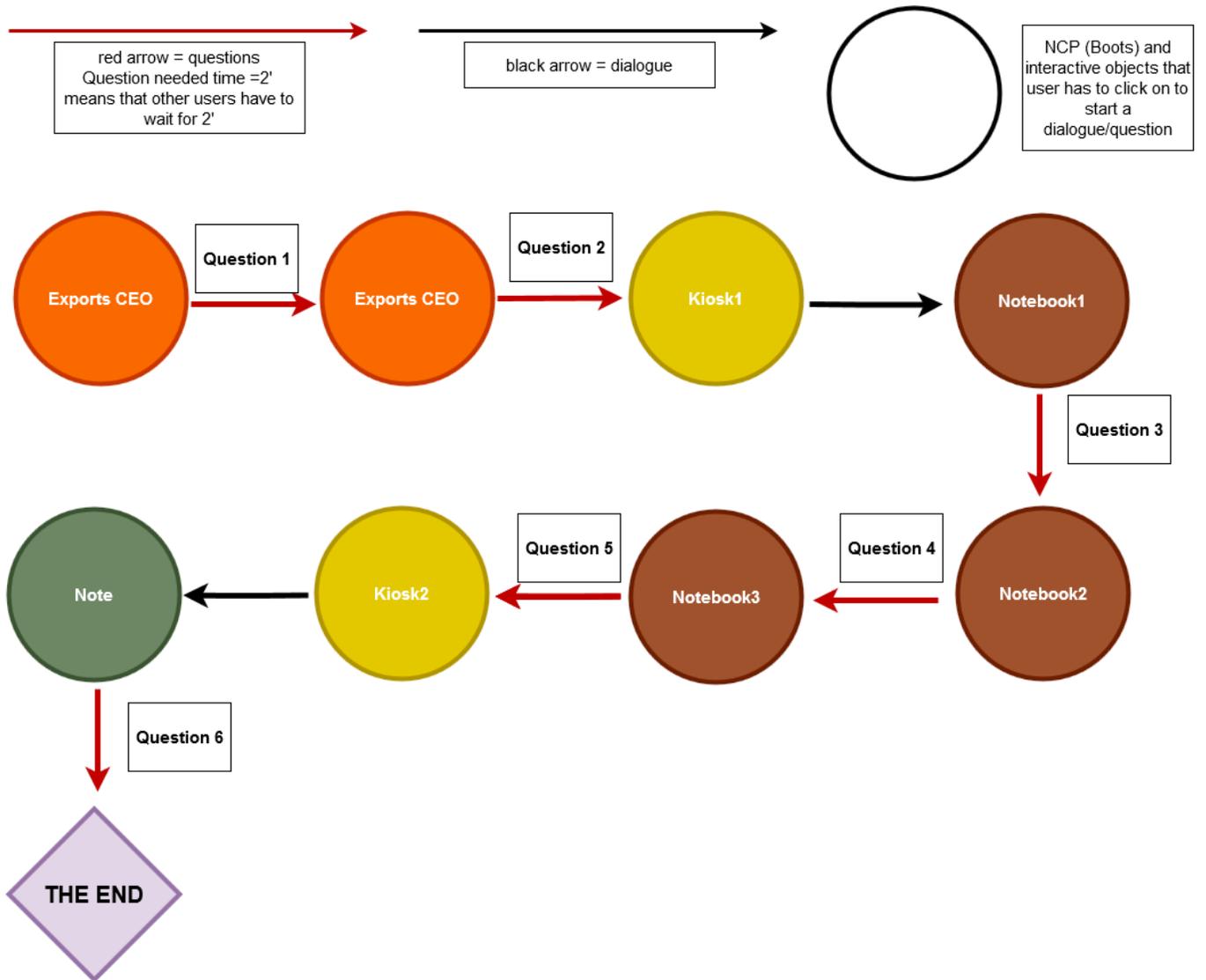
Step7: The user touches a recommended kiosk and receives directions about question no6

Step8: The user touches a recommended note so as to receive question no6. Users have to find the correct answer which will include direction about the next step

Step9: END of the scenario. Users receive their code (in a form of badge which will be placed in their inventory) and they are teleporting outside of the building

The diagram representation of the technical implementation for this scenario is the following:

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6.4 SCENARIO: SPOTTING OPPORTUNITIES

6.4.1 General description

This scenario will be implemented inside a house. In this scenario user is a social entrepreneur who is starting his/her business but still perfecting his/her idea so he/she works from home. User needs to learn how to spot opportunities that can contribute in reaching his/her goals.

6.4.2 Technical implementation

- **Duration:** 15 min
- **Type of questions:** multiple choices
- **Number of questions:** 4 questions
- **Number of BOTs/NPC:** none
- **Number of interactive objects:** 3- 1 door, 1 computer, 1 kitchen note

In front of the house, there will be an informative kiosk with the main summary of the scenario as well as with the specific directions. Users will have to click it and the summary will displayed as notification card

The house will consist of 2 floors and it will be equipped with all needed rooms such as kitchen, living-room, bathroom etc. the users will be able to navigate the house during the implementation of the scenario

In order to start the implementation, the user will have to perform the following steps:

Step1: Entering the house: In order to enter the house, user will have to click the main door directions about question no1

Step2: The user touches a recommended notebook so as to receive question no1. Users have to find the correct answer which will include direction about the next step

Step3: The user touches a recommended phone so as to receive question no2. Users have to find the correct answer which will include direction about the next step

Step4: The user touches a recommended computer so as to receive question no3. Users have to find the correct answer which will include direction about the next step

Step5: The user continues interacting with the computer (by clicking it again) so as to receive directions from question no 4

Step6: The user touches a recommended kitchen-note so as to receive question no4. Users have to find the correct answer which will include direction about the next step

Step7: END of the scenario. Users receive their code (in a form of badge which will be placed in their inventory) and they are teleporting outside of the building

The diagram representation of the technical implementation for this scenario is the following:

