This document describes the implementation of a GLP, along with the required functionalities from the authoring perspective. The goal is to get a clear understanding of:

A) How a lesson plan is translated into a GLP

In general, a Lesson Plan is translated into a Gamified Lesson Plan when the activities it entails are adapted to the specific needs of the teachers and integrated into the 'slots' of a fitting Game Plot and deployed. The Beaconing Lesson Plan Archive should suggest appropriate Game Plots depending on the number of Quests/activities teachers might want to deploy, and allow them to edit the Plan through the Authoring Tool before deployment. The resulting GLP will be partially procedurally generated in its narrative. The example below provides one possible translation from the pedagogical contents into a gamified narrative.

B) What features the authoring system should provide, so that the learning designer/teacher can achieve his/her goals

Aside from the basic functionalities already established, the authoring system should provide:

- The possibility to define multiple minigames for a slot and students experience one at random.

- The possibility to define both passwords and success thresholds that have to be met for the student to be able to continue in the narrative.

- The possibility to run repeatedly Quests, and chains of Quests (as in, provide loops).

- Ideally, the possibility to change some or all of the narrative text to fit more closely the theme of a specific lesson path. In the included examples, some parts are within [parentheses], so that the teacher can more closely adapt the narrative to the theme of the lesson path. For example, [device] might mean a computer, a power generator, an aspect of the environment, [problem] might mean a glitch, a flood, an energy shortage, etc.

C) What features a GLP should have in order to do this (upload activity, type of minigames, etc) - Example: Robotics & Computer Science Gamified Lesson Plan

The present document showcases a slightly modified and simplified version of the "Save the Boss" narrative, as integrated with a slightly updated/unpacked version of the Robotics & Computer Science Lesson Path.

Ideally, all GLPs should feature the possibility to upload content to provide evidence to be shared not only with the teacher but with other users of the same GLP, or, alternatively, the possibility for teacher to allow progress (e.g. through a password) only on the condition that student provides the evidence through more traditional means (e.g. in person or through normal email)

Quest 1
(Introduction to the course via a geolocalization game)

Game Plot Element: In this scene players gets introduced to the scenario. They have to go and meet the mentor for a rendez-vous. They discover that there has been an emergency lockdown and needs to find keys to the security gates, triggering the first activity.

Lesson Plan Content: Discover the LEGO Mindstorm physical solution. To find the components, they will be directed in an educational treasure hunt among their school /neighborhood (GPS-based) to discover the relevant LEGO bricks and learn more about the role of technical bricks they will need later for the construction of their own robot. Hints are provided in the form of technical details about LEGO Mindstorm gears/sensors/motors, thus acquainting students with the tool.

Authoring requirements: The ability to adapt the Location Based Activity to the specific context and components at hand.

Activity Requirements: The GPS/Beacon based treasure hunt via BEACONING, using the TREASURE HUNT/FOLLOW THE PATH type of Location Based Activity to gather all the LEGO components while learning about them.

Quest 2
(Knowledge acquisition via documents)

Game Plot Element: After passing the gates, players need to remember where is their rendez-vous point with the mentor. They need to gather and read resources before continuing.

Lesson Plan Content: a presentation of the Mindstorm software and hardware components, in video or written form.

Authoring requirements: the teacher must be able to provide specific links to this external documentation, or to enable the platform to display it directly.

Activity Requirements: Students simply have to get through the content before proceeding with the GLP. The system must be able to check for this requirement, or otherwise enable the teacher to let students progress once they are through with it (e.g. by providing a password).

Quest 3
(Know-how acquisition/learning by doing via workshop activity)

Game Plot Element: The mentor informs players that there is a [problem] and sends them to help a Non-Playable-Character (NPC) to fix it. This NPC is not present but the player can talk to NPCs who should know where he is.

Lesson Plan Content: The instruction to build the first robot obeying Radio Commands.

Authoring requirements: to be able to specify and link (or display) to students instructions for building the robot, and specify how to obtain evidence and allow for progress.

Activity Requirements: Ideally, students should be able to upload in a central storage photos/short videos of the working robot (and the construction process) to be shared with other users of the same lesson path, and validated by the teachers. Alternatively, teachers will provide a password to progress in the GLP once they have ensured students have a working robot, whether in person or through documentations submitted via traditional means.

Quest 4
(Knowledge acquisition via documents)
Game Plot Element: Once the NPC is found they go to the meeting room and Al invites the player to check how [a device] works.

Lesson Plan Content: Discovering basic principles of programming (tests, loops) through documentation in written or video form.

Authoring requirements: the teacher must be able to provide specific links to this external documentation, or to enable the platform to display it directly.

Activity Requirements: Students simply have to get through the content before proceeding with the GLP. The system must be able to check for this requirement, or otherwise enable the teacher to let students progress once they are through with it (e.g. by providing a password).

Quest 5
(Knowledge retention test via mini game)
Game Plot Element: The NPC asks the player to go find the missing elements of the above [device] in various locations.

Lesson Plan Content: The students will play the Robocode minigame to test their knowledge. Presently, the minigame used is one offering multiple choice questions, in the future the minigame will be one of the existing minigames specifically about coding.

Authoring requirements: to be able to specify a minigame for a slot, and a threshold for successful progress.

Activity Requirements: Any quiz minigame and a threshold function. Even preferable would be to have the robotics challenge from Imaginary, and it should allow students to define loop statements when solving the minigame puzzle.

Quest 6
(Know-how acquisition/learning by doing via workshop activity)
Game Plot Element: Once every parts are gathered the player needs to assemble them on the [device]

Lesson Plan Content: Apply those principles inside the Mindstorm software by writing a script that allows a robot to move autonomously according to specific conditions.

Authoring requirements: to be able to clearly specify how the robot should move, and to adapt the instructions to the teachers' needs.

Activity Requirements: Ideally, students should be able to upload in a central storage the scripts, to be shared with other users of the same lesson path, and validated by the teachers. Alternatively, teachers will provide a password to progress in the GLP once they have ensured students have a working script, whether in person or through documentations submitted via traditional means.

Quest 7
(Know-how acquisition/learning by doing via workshop activity)
Game Plot Element: The [device] works again. The player needs to repurpose it for their use.

Lesson Plan Content: The instructions to build the first robot displaying a little bit of autonomy regarding movement

Authoring requirements: to be able to specify and link (or display) to students instructions for building an autonomously moving robot, and specify how to obtain evidence and allow for progress.

Activity Requirements: Ideally, students should be able to upload in a central storage photos/short videos of both the working robot and the script that regulates its movements to be shared with other users of the same lesson path, and validated by the teachers. Alternatively, teachers will provide a password to progress in the GLP once they have ensured students have a working robot and scripts, whether in person or through documentations submitted via traditional means.

Quest 8
(Knowledge acquisition via documents)

Game Plot Element: Everyone congratulates the players. However, the mentor is wondering why the [device] had missing elements and invites the player to investigate them, as it might be a case of sabotage.

Lesson Plan Content: Presentation of new sensors and programming ideas through documentation in written or video form.

Authoring requirements: the teacher must be able to provide specific links to this external documentation, or the platform to display it directly.

Activity Requirements: Students simply have to get through the content before proceeding with the GLP. The system must be able to check for this requirement, or otherwise enable the teacher to let students progress once they are through with it (e.g. by providing a password).

Quest 9
(Knowledge retention test via mini game)

Game Plot Element: An NPC and the player are back at the [device], which is now working. The NPC suggests that there might be a new [problem], but it's actually just an excuse to explore new tools.

Lesson Plan Content: A quiz is given to the students to test their broadened knowledge of programming through a minigame of the multiple choice questions kind**.**

Authoring requirements: to be able to specify a minigame for a slot, and a threshold for successful progress.

Activity Requirements: Any quiz minigame and a threshold function.

Quest 10
(Know-how acquisition/learning by doing via workshop activity)

Game Plot Element: NPCs give the players new tools, and suggest that they should also inspect other areas for [evidence] of sabotage.

Lesson Plan Content: Applying what was learned to improve the robot and make it capable of passing new tests.

Authoring requirements: to be able to specify and link (or display) to students instructions and suggestions toward building an improved, autonomously moving robot, and specify how to obtain evidence and allow for progress.

Activity Requirements: Ideally, students should be able to upload in a central storage photos/short videos of both the working improved robot and all the script that regulate its movements to be shared with other users of the same lesson path, and validated by the teachers. Alternatively, teachers will provide a password to progress in the GLP once they have ensured students have a working robot and scripts, whether in person or through documentations submitted via traditional means.

Quest 11
(Knowledge acquisition via documents)

Game Plot Element: an NPC asks the player to check the [device] room. The player inspects it and finds some [evidence] of sabotage. It is suggested that the player brings it to be analysed.

Lesson Plan Content: Presentation of a variety of possible challenges through which to test the capabilities of the robots students have built, in written or video form.

Authoring requirements: the teacher must be able to provide specific links to this external documentation, or the platform to display it directly.

Activity Requirements: Students simply have to get through the content before proceeding with the GLP. The system must be able to check for this requirement, or otherwise enable the teacher to let students progress once they are through with it (e.g. by providing a password).

Quest 12
(Know-how acquisition/learning by doing via workshop activity)

Game Plot Element: Player work with an NPC to prepare analyses of the [evidence] of sabotage of the [device]

Lesson Plan Content: Students to set up a competition between their robots, involving a maze of sensors with a specific focus (colors, touch, sounds, etc.). The competition can be done virtually or with everyone in the same place. Several bouts should be organized to test the reaction of robots specialised towards different type of mazes (colors, touch, sounds, etc.) and prepare for later quests.

Authoring requirements: to be able to specify and link (or display) to students suggestions for building a maze, and specify how to obtain evidence and allow for progress. Ideally, this and the following Quest should be able to be run repeatedly, building different mazes.

Activity Requirements: Ideally, students should be able to upload in a central storage photos/short videos of the maze to be shared with other users of the same lesson path, and validated by the teachers. Alternatively, teachers will provide a password to progress in the GLP once they have ensured students have a working robot and scripts, whether in person or through documentations submitted via traditional means.

Quest 13
(Know-how acquisition/learning by doing test via workshop activity)

Game Plot Element: An NPC gives the result to the player and recommends him to make a search on the agency computer. However, the computer has been locked down during the alert and needs to be debugged.

Lesson Plan Content: Students to run the competition set up in the above quest, and document both process and outcomes.

Authoring requirements: A leaderboard and records of time to break will be established. Ideally, this and the preceding Quest should be able to be run repeatedly, building different mazes.

Activity Requirements: Ideally, students should be able to upload in a central storage photos/short videos of the competition to be shared with other users of the same lesson path, and validated by the teachers. Alternatively, teachers will provide a password to progress in the GLP once they have ensured students have a working robot and scripts, whether in person or through documentations submitted via traditional means.

Quest 14
(Knowledge and know-how retention test via a geolocalization game)

Game Plot Element: The player sees that there are too much results and needs to ask for the help of the team. Includes various interactions with NPCs.

Lesson Plan Content: The second competition between students' robots is set to test their versatility. The mazes built during Quests 13 are now located in different parts of the school/neighbourhood. Players are allowed to use only a single robot, and need to complete the activity at a table, then find and complete the next one, with hints being provided based on the theoretical aspects of the GLP.

Authoring requirements: A leaderboard and records of time to break will be established. Ideally, this and the preceding Quest should be able to be run repeatedly, building different mazes.

Activity Requirements: The GPS/Beacon based treasure hunt via BEACONING, using the RAT RACE type of Location Based Activity, will enable players to run through the mazes through which to test their robot. Ideally, students should be able to upload in a central storage photos/short videos of the competition to be shared with other users of the same lesson path, and validated by the teachers. Alternatively, teachers will provide a password to progress in the GLP once they have ensured students have a working robot and scripts, whether in person or through documentations submitted via traditional means.

Quest 15
(Know-how acquisition/learning by doing test via workshop activity)

Game Plot Element: Players can then talk again with all the team to retrieve the results and finally can be back to the computer to retrieve the search results. At the moment the results are revealed, everyone is surprised!

Lesson Plan Content: students should reflect on the process, collate the documentation and provide a final multimedia report.

Authoring requirements: to be able to specify and link (or display) to students instructions for this final report, and specify how to obtain evidence and allow for progress. Optionally, links to analytics gathered throughout the GLP might be at this point employed to obtain a more formal assessment.

Activity Requirements: Ideally, students should be able to upload in a central storage their final report (inclusive of photos/short videos) to be shared with other users of the same lesson path, and validated by the teachers. Alternatively, teachers will provide a password to progress and conclude the GLP once they have received and (optionally) assessed the reports.