What is the HERA Project?

21st century societies have to face complex challenges: responsible natural resource management, mitigating climate change, addressing natural risks, fighting poverty, informing global health, etc. These challenges require solutions that weave skills and knowledge from diverse subject areas and sectors towards introducing integrated, viable, and sustainable solutions. Solutions to these challenges do not stem from the deployment of knowledge from a specific area, but they require the integration of knowledge from diverse fields. In a broad sense, solutions to many of these challenges are rooted in a combination of engineering and economic principles.

Therefore, Higher Education (HE) faces the challenge of building not only the foundational knowledge of young professionals, but also the soft skills and mindsets that young adults need to become leaders and innovators in designing integrated, effective, and equitable solutions. It needs to shape young adults that are problem solvers, high level and critical thinkers, innovators in the face of rapid evolution of technology and business processes, effective collaborators in multiple social contexts and large groups, and capable of learning independently throughout their lives in order to remain at the forefront of their fields.

HERA aims to achieve the above objectives by introducing an active, gamified and experiential learning approach that will challenge learners to collaborate, think entrepreneurially and weave diverse knowledge towards introducing solutions to non-trivial problems inspired by 21st century needs. Digitally enabling the problem-solving process will effectively increase class communication, knowledge exchange, peer learning, and collective skill building, contributing to the development of desirable transversal skills.

These include:

- Following a systemic design process
- Collaboration in teams, fostering industry demanded complex communication skills
- Development of problem solving skills
- Facilitation of brainstorming and sharing of key ideas
- Evaluation of information stemming from different sources
- Effectively formatting a problem and solution objectives
- Critical and innovative thinking
- Working with limited resources
- Designing for end users

Gamifying the problem-solving process will promote active student engagement in learning through a sense of mission, a sense of affiliation, healthy competition, rewards, and social recognition by peers among other mechanisms.

HERA is aimed at the development of soft-skills for Higher Education Engineering and Economic students through collaborative serious games.
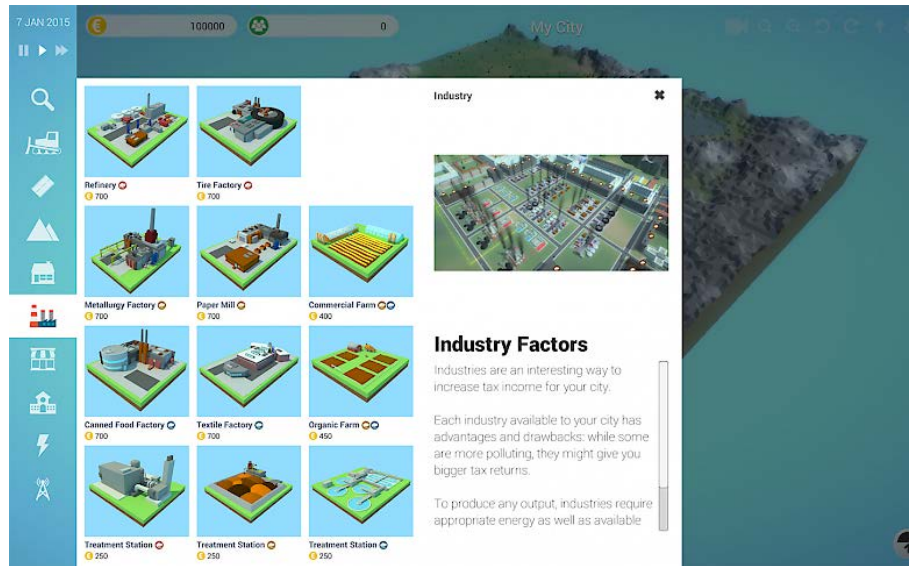
Serious game platform

HERA proposes the design and development of a digital learning game platform whose goal is to expose students to complex challenges, the solution to which requires integration of knowledge from diverse fields in a manner that simulates how engineering and economics professionals work and collaborate in the real world.

From the student point of view, the platform will show the typical landscape of a virtual city game, like SimCity, where it is possible to perform different actions to develop a city in an appropriate and suitable way. This city landscape will involve 3 different scenarios, yet to be selected, each one proposing a specific challenge related to a non-trivial problem inspired by 21st century needs. Possible scenarios include the management of water provision and disposal needs, designing green energy coverage for a town, implementing environmental upgrades to public buildings, providing public transport to reduce pollution, etc., all of them considering budget and resources limits, possible environmental impact, citicens' satisfaction (social perceptio), etc.

To solve these challenges players will have to take different roles, representing different stakeholders with different goals, interests and resources, and make decisions related to the design of the city, the selection of th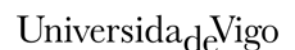e elements to be included, the use of the budget, the satisfaction of the citizens, etc. Such roles will be played by different students that will need to collaborate with others players to advance in the game.

The HERA platform will provide a post-it facility to enable communication and collaboration and a project management tool to enable management and coordination. Gamification mechanisms, focused on promoting the long term engagement of students, may include: rewards for engagement, collaboration, and feedback generation; clear, relevant, and inspiring missions; a sense of affiliation, belonging, and inclusiveness; leaderboards and social recognition. A peer-based assessment system will be included to further promote the involvement of the students.

The proposed learning game will simulate the nature of real world problems, preparing HE students to effectively act as professionals in the real world by taking into account technical feasibility, resource availability, and societal acceptance.cv

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