

Intellectual output 3. Educational support content targeting instructors

Learning sheets for HERA activities

e-Commerce infrastructure for a city

Topic: e-Commerce, infrastructure, industry, business, culture, quality of life

Introduction

e-Commerce has been gaining momentum and market share over the past decades. In the COVID-19 era, e-Commerce has emerged as a viable option for ensuring the continuation of economic activity. Supporting e-Commerce relies on low fixed operational costs, fast internet connections and information technology infrastructure, energy infrastructures, and a healthy economy that supports consumer spending. All of these can lead to increased economic activity that ultimately leads to better quality of life.

This activity simulates the design of a city in which e-Commerce can thrive

as a result of effective urban design and quality of life. Students are challenged to design a city that has

sound infrastructures, which may include business facilities in both high and low cost areas for supporting high growth based on low operational costs, energy networks, internet service providers, and an urban design that promotes quality of life through the inclusion of elements related to education, culture, health, and safety.

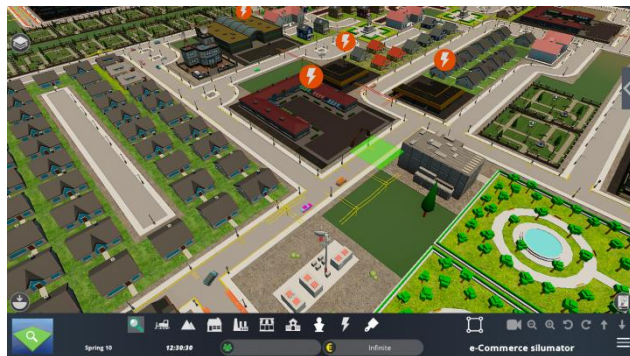


Figure 1. Neighborhoods and parks provide a friendly living environment for city inhabitants.

Context

The activity is designed for deployment in wider learning contexts that combine both engineering and economics principles. It may be deployed, for example, in the context of economics courses in engineering departments or in ICT supported e-Commerce courses in economics departments. The simulator is open ended and allows students to experiment with their own solutions towards achieving the scenario goals.

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Participants can assume 1 of 4 foreseen roles. They have a common goal as well as individual goals. The common goal of the participants is create a buzzing e-Commerce scene. The individual roles and their objectives are:

Role 1: e-Commerce developer

The e-Commerce developer aims at increasing the amount of e-Commerce that takes place in the city. She achieves this by building small and large industries, which engage in e-Commerce. Her goal is for the city to achieve a healthy industrial and commercial income.

Role 2: Urban developer



Figure 3. Hospitals ensure health services for city inhabitants.

The urban developer aims at increasing the population of the city. He achieves this by making the city an attractive place to live in. The urban developer builds housing and public services such as parks, schools, universities, fire stations,

hospitals, and police stations that address the needs of the city population. His goal is for the city to

reach a predefined number of inhabitants in the city and to raise the happiness indicator. The inhabitants will populate the city as the urban developer provides desirable services.

Role 3: Culture developer

The culture developer aims at increasing culture activities in the city. He achieves this by building museums and other facilities. These services promote quality of life in the city and well-being, which makes the city a happier place and more livable place for inhabitants



Figure 2. Museums, sports facilities, and festive markets introduce cultural interest in the city.

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Figure 4. Nuclear power plants ensure adequate energy provision.

Role 4: Technical infrastructure developer

The technical infrastructure developer aims at introducing the digital services that will allow the development of e-Commerce. This includes an energy network, an internet network, and a phone network. The technical infrastructure developer has high

goals. She needs to ensure that the vast majority of the population has access to internet and phone, while almost the entirety of the city has access to electricity. These 3 services combined will promote the engagement of a large percentage of the city population in e-Commerce.

The following figure demonstrates the roles and the interactions between them.

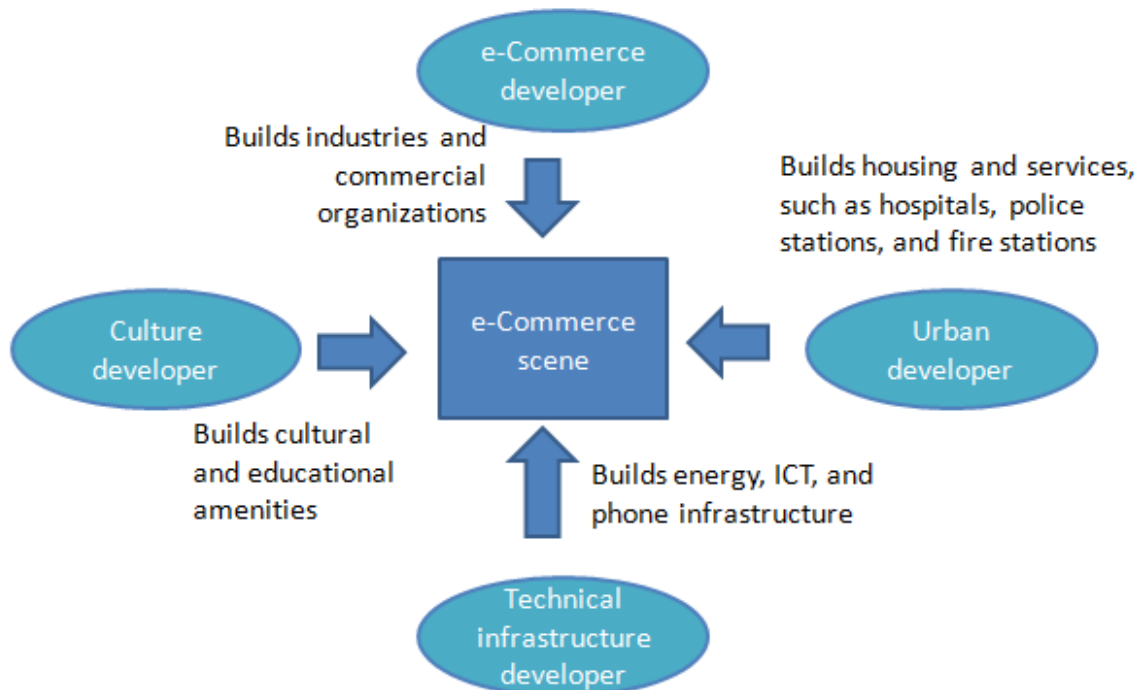


Figure 5. Roles, actions, and interactions.

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Learning goals

Upon completion of the activities students will:

- Understand and apply e-Commerce concepts.
- Understand and apply ICT infrastructure design.
- Understand and apply concepts related to public services urban design for promoting quality of life.
- Have enriched their critical thinking skills, collaboration capacity, independent research skills, and innovative thinking.

Prerequisites

The activity can be introduced to students with minimum pre-required information. It self-contained. All concepts may be introduced by the teacher during an initial briefing. Students need only to have basic understanding of the function of electricity and internet networks and the curiosity to design a city environment that will make e-Commerce flourish.

Audience

e-Commerce is relevant to both computer engineering and economics students as it relies equally on technology and business. The suggested activity targets economics and engineering students enrolled in both undergraduate and graduate learning offerings related to e-Commerce design and the deployment of ICT in economic development.

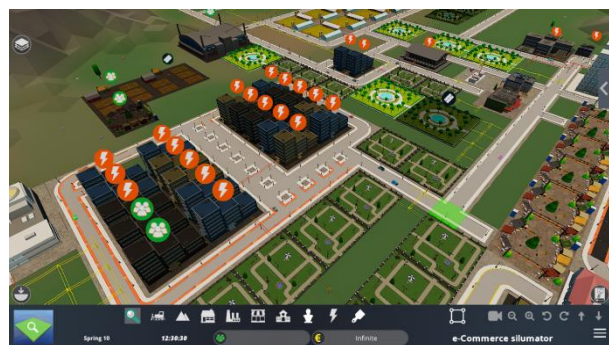


Figure 6. Office buildings provide working space for city economic activities.

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Core concepts

- **e-Commerce:** Economic activity that takes place over the internet. Through e-Commerce individuals and business have the opportunity to buy and sell products and services on-line.
- **Energy grids:** Energy infrastructures, including diverse energy production plants, such as nuclear, coal-based, or renewable energy based, energy transformers from high, to medium, and low voltage, and power lines that transport energy to homes, businesses, and industry.
- **Culture:** Arts and other manifestation of human intellectual achievement. In the context of this scenario, culture refers to all activities that promote education, expression, and athletics and foster a high quality of life.
- **Internet and phone service provider:** A company that provides access to the internet for both personal and business customers. The service requires a network infrastructure, including servers and cables for connectivity and processing of information.
- **City management:** Managing the services, revenues, and expenses of a city.
- **Transversal skills:** collaboration, critical thinking, analytical thinking, innovative thinking.

Description of the scenario

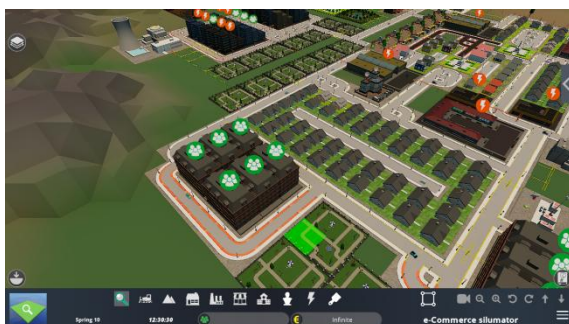


Figure 7. Universities provide educational services.

The scenario encourages students to think of creative ways through which they can create a flourishing e-Commerce environment in their city.

To achieve this goal, students need to work collaboratively. The work is divided

into roles, none of which has the capacity to achieve all goals individually. However, collectively the team members have all the capabilities required for succeeding in the scenario objective of building a buzzing e-Commerce environment. This requirement for

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collaborative work makes the scenario challenging and prepares students for their future professional roles in multidisciplinary teams.

The division of work is both realistic and promotes team work. More specifically, the scenario simulates the real life roles of an urban designer, who builds effective city plans for fostering development and quality of life, a technical infrastructure engineer, who ensures that the city is functional through network and energy grids, a cultural director, who coordinates educational and cultural activities, and an e-Commerce director, who benefits from the work of the other roles for supporting businesses and industries ensuring that the city will thrive economically.

Students are encouraged to experiment with the scenario city, which is pre-built. They are allowed to alter the pre-built city, introducing additional services such as educational buildings, internet connectivity, energy plants, fire stations, police stations, health providers, businesses, industry, and more. By adding new elements in the city, students make it more attractive and increase the economic activity towards achieving their collective team objectives for industrial and commercial city income generation.

Suggested class activity

1. The teacher introduces the HERA game. She then introduces the e-Commerce scenario objectives and the individual role objectives.
2. Students break into teams of 4 individuals, each of whom assumes one of the foreseen roles.
3. Team members brainstorm in order to understand the problem and the parameters within which they have to work. This includes the city budget and the individual role objectives, as these are described above.
4. Students are encouraged to come up with as many ideas as possible through brainstorming. Techniques of design thinking could be used for promoting



Figure 8. Internet service providers facilitate e-Commerce.

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innovative design and the introduction of a human-centered solution that address actual needs of city citizens.

5. Each student logs into the game. Team members individually use the resources available to them and the role capabilities as these are defined in the game scenario to build city infrastructures and services for achieving their individual objectives.
6. The students discuss the game results and their roles; the teacher gives feedback.
7. The teacher may introduce questions for initiating class discussion, such as:
 - What would happen if the city included more businesses?
 - Would you choose a different city plan, and how would the city plan affect economic activity?
 - How would you attract more inhabitants into the city? What services would be desirable, leading to higher city population?
 - How would you measure the happiness of the inhabitants?
 - Does culture and education add to the scenario and promote e-Commerce as a result of higher quality of life?

Assessment methods



Figure 9. An industrial park hosts industrial activity.

This is a collaborative, open ended activity in which not a single solution exists. The purpose of the activity is to encourage students to think of creative ways to design city services for promoting economic activity over the internet.

Self assessment would offer students the benefit of taking responsibility of their learning. Students may discuss their roles within their group and reach a decision on whether and to what degree they achieved their goal.



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Students may further present their solution to the entire class receiving evaluation from their peers.

Finally, the class may decide on the more creative solutions among all teams.