SLOG 4.0

Digital and green skills for boosting innovation and sustainability of the logistics sector

PROJECT AIMS

The project links two frameworks: sustainability/green skills and 4.0 technologies/digital skills within the field of logistics and aims to adapt green and digital skills of students to the requirements of the industry 4.0.

"TO INCREASE THE ADOPTION OF SUSTAINABLE AND DIGITAL PRACTICES IN THE LOGISTICS SECTOR, SECTOR RESPONSIBLE FOR CREATING SUBSTANTIAL COSTS FOR SOCIETY."

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PRESENTATION ON...

SLog4.0 Unveiled at ICQIS 2024

At the recent **International Conference on Quality Innovation and Sustainability (ICQIS) 2024**, on the 18th of June, researcher and project collaborator Pedro Costa unveiled the groundbreaking SLog4.0 project.

Some of the highlights of the presentation:

Logistics, a critical sector responsible for the transportation and storage of goods, faces increasing scrutiny over its environmental impact. The industry is often criticized for **contributing to CO2 emissions, extensive use of packaging, and reliance on new transportation infrastructure**, all of which pose significant **environmental challenges.** The recent surge in e-commerce, exacerbated by the pandemic, has further highlighted the need for more sustainable logistics solutions.

Central to the project are several key questions:

- How can higher education institutions (HEIs) **adapt to these rapid changes?**
- What constitutes a **future-proof curriculum?**
- How can current educational frameworks be modified to **incorporate Industry and Logistics 4.0 principles?**
- And most importantly, how can **students** be prepared for a **sustainable and green future?**

PRESENTATION ON...

SLog4.0 Unveiled at ICQIS 2024

The SLog4.0 project addresses these concerns by advocating for the adoption of Industry 4.0 technologies within the logistics sector. By cultivating a new generation of workers equipped with a sustainability-oriented mindset and comprehensive skills aligned with the **Logistics 4.0 paradigm**, the project seeks to **enhance efficiency while meeting environmental, social, and economic sustainability goals.** This initiative is crucial as logistics must evolve to keep pace with rapid technological advancements and increasing environmental demands.

One of the project's significant outputs is a set of Design Principles, formulated after a thorough training needs analysis. These principles will underpin the **creation of a multidisciplinary curriculum** covering various essential topics and learning outcomes. The planned training course will include modules such as **"Logistics 4.0 in Smart Society", "Sustainability in Logistics 4.0",** and **"IIoT: Adopting 4.0 for Green Logistics".**

By bringing together expertise from various fields, the SLog4.0 project aspires to overcome the challenges of creating an advanced training program for HEI students. This program will **support the green and digital transformation of the logistics sector,** ensuring that future professionals are well-prepared to drive innovation and sustainability in an ever-evolving industry.

ETHICAL AND RESPONSIBLE AI IN LOGISTICS

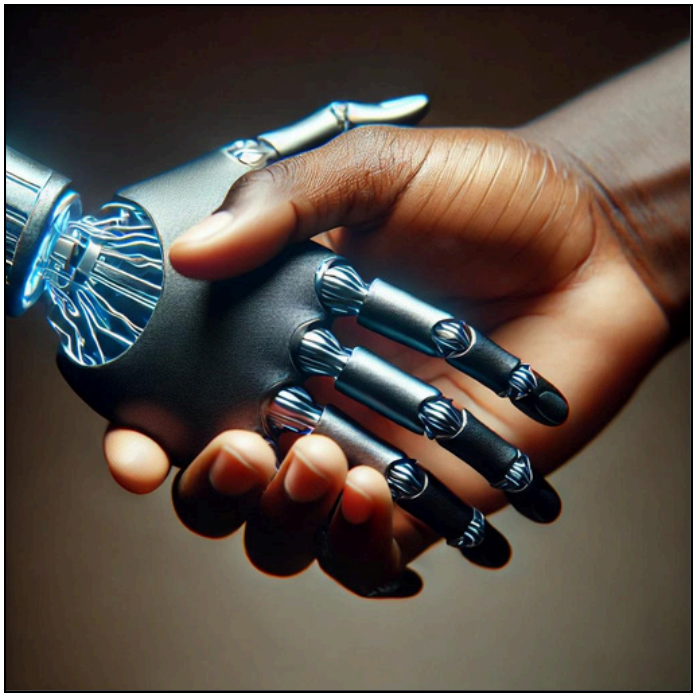
In the rapidly evolving field of logistics, the integration of artificial intelligence (AI) and machine learning (ML) technologies promises significant enhancements in efficiency and service quality. However, as we advance into an era dominated by digital intelligence, **it is crucial to address the ethical challenges posed by these technologies.** Ethical and responsible AI implementation in logistics is not just a regulatory necessity but a commitment to societal welfare and sustainability, **aligning with the overarching goals of Society 5.0.**

Society 5.0, a concept introduced by **Japan's 5th Science and Technology Basic Plan,** envisions a human-centered society where **economic advancement is balanced with the resolution of social problems through a system that highly integrates cyberspace and physical space** (Fukuyama, 2018). In logistics, this integration entails using AI to optimize supply chain efficiency and resource management while **ensuring that technology serves the broader community interests, including environmental sustainability and social fairness.**

One of the foremost ethical considerations in AI-driven logistics is transparency. **Transparency in AI involves clear communication about how AI systems make decisions, the data they use, and their performance metrics.** This is crucial not only for **building trust** among stakeholders but also for **facilitating accountability** in case of errors or biases (European Commission, 2019). For instance, if an AI system is used for inventory management, stakeholders should be able to understand the basis of its demand forecasting and the factors influencing its stock replenishment recommendations.

ETHICAL AND RESPONSIBLE AI IN LOGISTICS

Fairness is another critical ethical dimension. **AI systems must be designed to avoid biases that can lead to discrimination or unequal treatment of certain groups** (European Commission, 2019). In logistics, this could mean **ensuring that AI-driven delivery route optimizations do not favor certain geographical areas over others without justifiable reasons.** Developing fair AI systems involves using diverse datasets that are representative of all relevant variables and continuously monitoring the outcomes to detect and correct any biases that may occur.



Accountability in AI-driven logistics operations means **establishing mechanisms to hold systems and their human overseers responsible for their outputs.** This includes implementing robust audit trails that document decision-making processes and any interventions made by human operators. It also means having clear policies and procedures in place for dealing with discrepancies, errors, or failures in AI applications (European Commission, 2019).

ETHICAL AND RESPONSIBLE AI IN LOGISTICS

Incorporating AI into logistics must also be aligned with **sustainability goals.** This involves **using AI to enhance the efficiency of transport routes and load management, thereby reducing fuel consumption and carbon emissions.** Moreover, AI can help in achieving greater material sustainability through **improved waste management practices** that predict the lifespan of materials and optimize their reuse in the supply chain.

To ensure these ethical principles are met, ongoing **collaboration between technologists, ethicists, industry stakeholders, and policymakers is essential.** Developing standardized guidelines and frameworks can help in the operationalization of these ethical principles. **Educational initiatives, such as the proposed SLog4.0 course, play a pivotal role in preparing future logistics professionals to engage with these technologies thoughtfully and responsibly.**

In conclusion, while AI and ML offer transformative potential for logistics, their integration into this field must be handled with a keen **awareness of ethical, social, and environmental responsibilities.** The success of Logistics 4.0 will depend not only on how well it integrates technology into its operations but also on how effectively it aligns these advancements with the **values and needs of Society 5.0.** Emphasizing ethical AI use in logistics will ensure that these technologies contribute positively to a sustainable, equitable, and efficient future.

Bibliography

European Commission. (2019). Ethics guidelines for trustworthy AI | Shaping Europe's digital future. https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai

Fukuyama, M. (2018). Society 5.0: Aiming for a New Human-Centered Society.

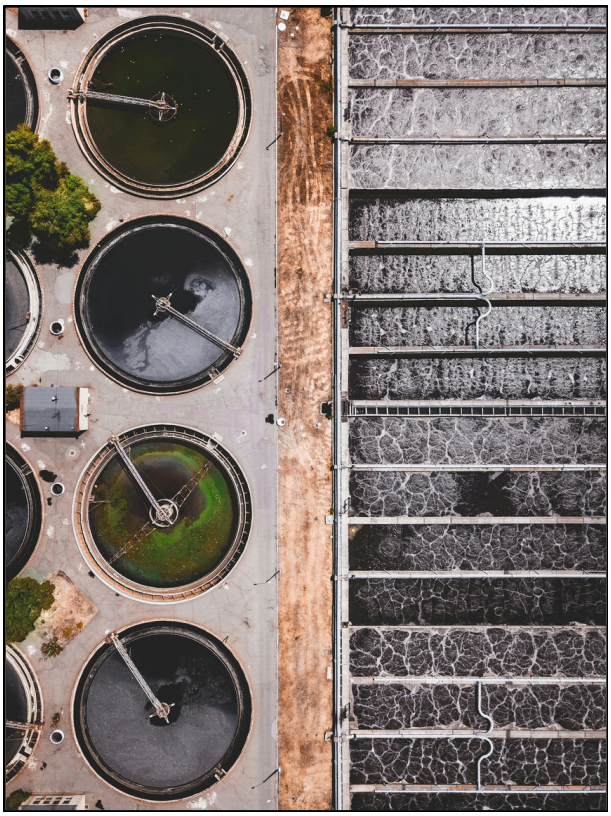
DID YOU KNOW...

Water Conservation in Logistics Operations

In the logistics sector, **the efficient management of water resources is crucial,** not only for **environmental sustainability** but also for **operational efficiency and cost reduction**. As we advance towards Logistics 4.0, integrating sustainable practices into every facet of the supply chain is imperative.

Water conservation in logistics can be approached through various effective strategies. Firstly, **rainwater harvesting** presents a significant opportunity. By installing **systems to collect and use rainwater** for non-potable purposes such as vehicle washing and landscape irrigation, logistics facilities can reduce their reliance on municipal water supplies. **Large logistics facilities with extensive roof areas** can collect substantial amounts of rainwater, thereby lowering their water utility costs and enhancing their sustainable practices.

Wastewater treatment is another critical area. Logistics operations, particularly those involving large-scale washing of vehicles or containers, generate significant amounts of wastewater. Implementing **on-site treatment plants** can **convert this wastewater into reusable water** for similar operations. Advances in technology now allow for the installation of modular and scalable wastewater treatment systems that fit well within the physical and operational confines of logistics centers. These systems not only reduce water wastage but also **prevent the contamination of local water bodies.**



DID YOU KNOW...

Water Conservation in Logistics Operations

Moreover, the adoption of **eco-friendly cleaning practices** plays a pivotal role in water conservation. The logistics industry traditionally uses large volumes of water and chemical cleaners, which can be harmful to the environment. **Switching to biodegradable and water-efficient cleaning agents helps reduce the overall water footprint and chemical runoff.** For instance, using **dry steam cleaning** for vehicles and warehouses **not only cuts down water usage by up to 90% but also eliminates the need for chemical detergents.**

In addition to these methods, employing **water-efficient technologies** such as **high-pressure, low-volume washing systems** can further enhance water conservation efforts. These systems use significantly less water than traditional methods by optimizing water pressure and volume to achieve the same or better levels of cleanliness.

In conclusion, integrating water conservation measures into logistics operations not only supports environmental sustainability but also offers significant operational benefits. By implementing strategies such as rainwater harvesting, wastewater treatment, and eco-friendly cleaning practices, logistics companies can lead the way in sustainable business practices.

WHAT IS SLOG4.0?

SLog4.0 is a European project that aims to promote the uptake of eco-friendly and technologically advanced approaches within the logistics industry, a sector known for generating significant expenses for society, including greenhouse gas emissions and pollutants. For this purpose, it aims to contribute to the formation of a fresh cohort of proficient professionals for the logistics sector, equipped with a sustainability-focused mindset and a comprehensive skill set aligned with the principles of Industry 4.0.

PROJECT INFORMATION

Name: Sustainable Logistics4.0: Digital and green skills for boosting innovation and sustainability of the logistics sector
Number: KA220-HED-B12C4B93
Duration: 36 months
Funding: Erasmus+ Programme of the European Union, call "Cooperation partnerships in higher education"

PROJECT PARTNERS

The consortium includes 4 universities that believe in the need of proposing an innovative training offer in the field of logistic 4.0 by developing a new interdisciplinary curriculum, and 3 companies providing specialized and advanced services, selected upon the expected commitment proven by consolidated previous relations and their acknowledged proficiency.
The partners of the project are:

- Poznan University of Technology (Poland) - coordinator
- University of Aveiro (Portugal)
- University of Gaziantep (Turkey)
- University of Maribor (Slovenia)
- Valuedo srl (Italy)
- ECQA (Austria)
- Zerynth srl (Italy)

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