







TECHLOG FINAL REPORT









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ENI CBC MED Programme Strategic Project

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TECHLOG

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TECHLOG Final Report

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1. Introduction

Welcome to the world of TECHLOG – a groundbreaking project co-funded by the European Union and brought to life through the ENI CBC MED Programme. Launched in July 2021, this initiative embarked on a mission to transform the connections between academia and the dynamic scopes of the port and transport sectors.

With a particular focus on the vibrant port regions of Italy, Egypt, Spain, Lebanon, and Tunisia within the Mediterranean, TECHLOG stands as a collaborative effort among esteemed partners representing academia, business support organizations, and chambers of commerce. Our team includes distinguished partners such as the:

- University of Cagliari
- Chamber of Commerce, Industry, Crafts, and Agriculture of Maremma and Tirreno
- Arab Academy for Science, Technology, and Maritime Transport
- Escola Europea Intermodal Transport
- Confederation of Egyptian European Business Associations
- Chamber of Commerce, Industry and Agriculture of Beirut and Mount Lebanon
- Federation of Egyptian Chambers of Commerce Alexandria Chamber
- Sfax Chamber of Commerce and Industry
- University of Sfax

At its core, TECHLOG aimed to establish a platform for collaborative Technology Transfer Initiatives (TTIs). But what exactly are Technology Transfer Initiatives? Think of them as collective blueprints for technological advancement in transport and port operations. These initiatives aim to establish standardized quality standards for specialized staff, fostering seamless and more efficient operations across the transport landscape.

TECHLOG smartly used advanced simulation technologies to connect academic research with real-world applications. The project's objectives included the creation of common TTIs and training protocols for both public and private transport companies, the establishment of a network of Research and Development Living-Labs, and the support of public officers in crafting coherent and common policies for advanced training in the transport sector.

create common TTIs & training protocols

construct a network of Research & Development Living-Labs

support public officers in crafting coherent & common policies

As we navigate through the Final Report, you'll witness the incredible journey of TECHLOG – a collaborative narrative illustrating how academia, technology, and the real economy come together to shape a future where everything flows effortlessly.





Join us in exploring the captivating intersection of these fields and the impactful achievements of TECHLOG's diverse and committed partners.

1.1 Objectives of the Final Report

The Final Report is here to highlight TECHLOG's journey, goals, strategies, and achievements, with a particular focus on the efficiency realized through advanced simulation technologies. The report underscores TECHLOG's successful role in strengthening connections between academia and the transport industry.

This Final Report serves as:

- 1. Comprehensive Documentation: Provide a detailed and comprehensive account of the entire journey of the TECHLOG project, covering its inception, milestones, and the completion of all activities undertaken.
- Showcasing Impact of Collaborative Initiatives: Demonstrate the positive impact of collaborative Technology Transfer Initiatives (TTI) on developing shared quality standards for transport and port specialized personnel and offer insights into the creation and functioning of the Mediterranean Open Lab.
- 3. Facilitate Knowledge Sharing for Exploitation of Project Results: Encourage the dissemination of TECHLOG insights and lessons learned to diverse stakeholders, resulting in a broader knowledge and usage of the project's outcomes in the (transport) industry.

Double click below to gain full insight on the TECHLOG and explore success stories directly from trained workers:



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1.2 TECHLOG Highlights

In this chapter, we delve into the highest points of TECHLOG's journey, shining a spotlight on key events that played a pivotal role in shaping the project's narrative. Beyond the meticulous details of trainings and evaluations, TECHLOG actively participated in significant conferences that brought its innovations to the forefront on the global stage.

• Participation at the International SIL Logistics Conference

Between the 7th and 9th of June 2023, TECHLOG partners made waves at the 25th edition of the <u>International SIL Logistics Conference in Barcelona</u>. This section unfolds the vibrant story of TECHLOG's engagement at this global platform, where the project showcased its cutting-edge simulation technologies and their real-world applications. From immersive simulations to a captivating truck driving competition, TECHLOG made a mark, emphasizing the transformative power of experiential education in the Mediterranean transport and logistics sectors.



• **TECHLOG Final Conference**

As TECHLOG neared the culmination of its 30-month journey, the project celebrated a significant milestone with the <u>TECHLOG Final Conference</u> held at the University of Cagliari on December 1st, 2023. This part of the chapter provides insights into the conference, highlighting the esteemed speakers, engaging roundtable discussions, and the active participation of stakeholders. The conference not only served as a platform to reflect on the project's achievements but also set the stage for future collaborations, cementing TECHLOG's legacy in the realms of logistics and technology.









2. Insights into Key Enabling Technologies for Transportation and Port Activities

In the TECHLOG project, we gained valuable insights into the cutting-edge field of transportation technology. The transport industry, known for its fast-paced innovation, readily adopts advanced technologies like Artificial Intelligence (AI), Virtual Reality (VR), and Augmented Reality (AR). These aren't just fancy tools; they make a significant impact on operational efficiency. This is demonstrated for example in terms of production and human labour, which can be implemented at lower costs and with less risks.

But what are Key Enabling Technologies or KETs? Key Enabling Technologies refer to a set of strategically important technologies that have a broad impact on industry sectors and are crucial for innovation and economic growth. KETs often serve as a foundation for the development of new products, services, and industrial processes.

TECHLOG went beyond theoretical exploration and actively worked on the practical application of these technologies to amplify their effectiveness. Spearheaded by the TECHLOG team at the University of Cagliari, project partners underscored that the transport sector's adoption of these technologies doesn't just add a modern touch but substantially improves efficiency. The emphasis was on fine-tuning and optimizing VR and AR, utilizing the synergy of AI and IoT to seamlessly integrate them for specific tasks and varying levels of control.





2.1 What insights and recommendations surfaced from the analysis of the KETs for (trans)port activities?

The primary challenge was to foster interaction between the supply and demand for innovation through the application of KETs. The project pursued a dual objective: firstly, to craft inventive training protocols for practitioners, accompanied by proposals for related public policies, and secondly, to offer recommendations for optimizing business processes.

TECHLOG effectively showcased the benefits of incorporating KETs into training and production processes, highlighting their positive impact on operators' skills and companies' profitability. Beyond technological advancement, the project emphasized the feasibility of building bridges between sectoral institutions, research centers, companies, and operators. The Living Lab played a crucial role, facilitating the development and testing of new training protocols. The methodology employed relied on an experiential learning model, integrating theory with practical simulations and interactions with advanced technologies.

The project underscored that utilizing KETs extends beyond technological progress; it serves as a powerful means of enhancing human skills and improving organizational structures. Furthermore, the incorporation of technology innovation within a training and production context revealed its potential to drastically improve both operator capabilities and the profitability of enterprises. TECHLOG's findings emphasize the complex impact of KETs, which include technological, human, and organizational dimensions.





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2.2 Who benefits from the technology transfer programs in the Mediterranean region?

TECHLOG is a game-changing project that fosters collaboration between academia and the Mediterranean transportation industry. The intended beneficiaries comprise a diverse spectrum, including:







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The project takes a unique approach, stressing practical application and advanced simulation technology, indicating a trend in the transportation sector toward hands-on and experiential learning approaches. This strategy shift bridges the gap between theoretical research and practical application, offering significant advantages to stakeholders across the Mediterranean region.







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Several engagement events were planned to connect with beneficiaries. Over ten roundtables and six events functioned as lively forums, drawing hundreds of people from the five Mediterranean countries. The findings will soon be published in two detailed studies that will exhaustively outline techniques and lessons gained for both the port and road transport sectors.

The emphasis during these exchanges was on thorough data gathering, which included three comprehensive questionnaires and tests in Italy. Performance assessments were undertaken for 90 trainees in Egypt before and after simulation training, mirroring a similar technique for 95 trainees in Lebanon. These initiatives were carefully designed to provide critical information sets, setting the groundwork for the TECHLOG project's exemplary practices.

2.3 What are the outcomes of TECHLOG's evaluation on the transferability of good practices?

The review of TECHLOG's best practices yielded positive and encouraging results. While we are still fine-tuning the technology transfer process, the results are promising. The project successfully proved the viability of developing and implementing innovative methods in a variety of spatial, cultural, and multidisciplinary contexts. The incorporation of new technologies such as simulation, artificial intelligence, virtual, and augmented reality has demonstrated their effectiveness in improving training and operational processes. These technology interventions have a substantial impact on skill development, firm competitiveness, and the efficiency of public policies.

Furthermore, the use of common standards in training and public policy emphasizes the adaptability and wider applicability of these techniques. These ideas clearly outstrip the project's initial scope, offering promise for widespread applicability in comparable circumstances. The collaborative attitude and emphasis on open innovation within the TECHLOG project further reinforce that these methods and technologies are not limited—they have significant transferability potential, with good effects extending far and wide.

2.4 Key Takeaways, Lessons Learned, and Future Considerations

TECHLOG unveiled a range of new possibilities for the Mediterranean transport sector. Navigating the multicultural landscape posed challenges to collaboration, yet the use of simulators emerged as a powerful facilitator in overcoming these hurdles. The industry's robust appetite for innovation became evident, revealing a clear need for ongoing advancements.

Looking into the future, the project's successful journey has fueled the desire to broaden its scope, catering to the continuous needs of companies, their workforce, and the untapped potential residing in research centers and universities. The continuity of TECHLOG is not merely a desirable prospect but an essential one. Future perspectives center around embracing comprehensive approaches and delving into how open innovation initiatives can shape and elevate the transport and logistics sector, not just in the Mediterranean but beyond.

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3 TECHLOG's Cross-Border Open Lab: Driving Innovation and Collaboration

The creation of the Cross-Border Mediterranean Open Lab (CBMOL) is a significant step toward stimulating innovation and collaboration not just among TECHLOG partners but also with external stakeholders. This strategic plan, led by the Chamber of Beirut and Mount Lebanon in close collaboration with all project partners, serves as a comprehensive roadmap, meticulously designed to establish Open Living Labs and outline the methodologies that will shape their operations. The following are the main components of CBMOL:

State of the Art & Governance Model:

- In-depth examination of current open innovation practices.
- Assess the governance structure of Living Labs, identifying roles and responsibilities.

Methodology & Operating Plans:

- Outline of open innovation stages, from initial planning to commercialization.
- Detailed operational plans of the Cross-Border Open Lab (CBMOL).

TECHLOG's commitment goes beyond planning, as evidenced by the establishment of two permanent cross-border living labs classified as Western (Cagliari, Italy, and Sfax, Tunisia) and Eastern (Beirut, Lebanon, and Alexandria, Egypt), along with a reliable <u>web-platform</u>. These cross-border open labs were created to facilitate technology transfer between research centers specializing in driving simulators and transport communities.

1. The Eastern Living Lab was inaugurated in Beirut on October 18, 2022





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2. The Western Living Lab was launched in Tunisia on November 23, 2022.



But what exactly are Living Labs? These collaborative spaces serve as environments where businesses and researchers join forces to develop creative standards and share technologies. They foster an environment of continual improvement and technological advancement in the port and transport industries. In addition to these Living laboratories, four simulator training laboratories have been strategically created in Beirut, Alexandria, Tunisia, and Cagliari, promoting a hands-on and immersive learning approach.

SEASTAR, an external IT company, developed <u>TECHLOG's collaborative platform</u> under the supervision of the University of Cagliari and the Chamber of Beirut and Mount Lebanon. This platform serves as a central hub for sharing ideas and knowledge, offering multilingual support in Italian, English, French, Arabic, and Spanish. Its user-friendly back-office ensures straightforward content management, catering to users with varying levels of IT expertise.

As the platform gains traction, especially with the posting of pilot action results, it is poised to become a central reference in the truck and crane driving industry, seamlessly integrating technology and innovation. The future prospects of this platform are promising, reflecting TECHLOG's commitment to leveraging technology for continuous improvement in the transport and logistics sector.







KEY INSIGHTS:

TECHLOG PLATFORM

REGISTERED USERS

East Facilitators

West Facilitators

East Operator Activated

36

West Operator Activated

64

USAGE & INTERACTIONS

162

News pieces on sector

Engagement Options

Easy contact with experts, booking simulation tests and more!

Visitor Interests:

- News & and articles about sector challenges, training on simulators, project news, activities, and outcomes from round tables.
- Articles on simulators, shipping sector transformation, and pilot actions on driving and operating performance (stress, fatigue, safety, eco-drive).





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4 Technology Transfer Initiatives (TTIs) and Capacity Building in TECHLOG

As we said before, the TECHLOG project laid the groundwork for transformative Technology Transfer Initiatives (TTIs) in Mediterranean transport and port operations, led by our partners at Escola Europea - Intermodal Transport. This key step entailed a thorough examination, analysis, and design of innovation needs, goals, and tactics. The final purpose was to pave the way for further TECHLOG Pilot Actions, which were especially designed to test the innovative training approach through simulation.

4.1 Empowering Innovation Trainers

As part of TTIs, a pivotal action was the development of a training package for innovation trainers. Aimed at professionals in the Mediterranean region, this package, publicly accessible through the TECHLOG web platform, empowered 17 innovation trainers. Comprising a guide and 11 presentations, it fostered an understanding of the benefits of simulation in training and academia-industry cooperation.



4.2 Visual Insights Through Video Tutorials

Complementing the training package, three instructive video tutorials were created. These engaging videos provide a closer look at the practical applications of TECHLOG simulators, each focusing on a different topic. The first tutorial zooms in on the truck simulator, offering insights into its functionalities and training benefits. The second tutorial centers around the crane simulator, showcasing its capabilities and contributions to skill development. The third video delves into the field of innovation training for trainers, shedding light on the methodologies and strategies employed. Hosted on the <u>web platform</u> and <u>project webpage</u>, these videos not only serve as accessible visual aids but also offer tailored insights, making them valuable resources





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for understanding the diverse applications and potential impact of TECHLOG simulators on training and innovation within transport and port communities.

Click the links below to view each tutorial:

- TECHLOG Truck Simulator Training
- <u>TECHLOG Crane Operator Simulator Training</u>
- TECHLOG Training of Trainers

4.3 Crafting a Shared Qualification Standard

The lasting impact of these initiatives is encapsulated in the joint proposal for a new shared qualification standard for advanced training programs. Eight stakeholders from Mediterranean transport and port institutions engaged in a capacity-building journey. This collaborative effort, conducted online and face-to-face, resulted in a policy proposal aligned with the European Qualifications Framework (EQF) as one of TECHLOG's most prominent achievements. This standard aspires to meet the TECHLOG countries' aspirations for a safer, greener, more efficient, and digitally enhanced future in crane and truck operations.



4.4 The Ripple Effect and Long-lasting Legacy

Beyond the immediate effects, the TTIs, trained innovation trainers, and stakeholders mobilized through capacity-building efforts and Living Lab events will have a long-term influence. These individuals are prepared to become change agents in their communities and businesses, supporting innovation, digitization, and training harmonization. TECHLOG's impact goes far beyond its immediate focus, fostering throughout the transport and port industries a culture of continuous improvement and reinvention.





5 Technology Transfer Pilot Actions

Our team embarked on a journey through the dynamic process of validating Technology Transfer and Innovation protocols in the TECHLOG project, led by our team at the Arab Academy for Science, Technology and Maritime Transport, where engagement with stakeholders was the first key to success. The story unfolds as each partner conducted roundtable discussions, collaborating to co-design and subsequently validate these groundbreaking initiatives.

The initial roundtables laid the groundwork, but the real test came during the secondary discussions. Here, the outcomes of the primary roundtables were put to the practical test in the vivid landscape of simulation training for crane and/or truck operators. Picture a comprehensive exploration, where each pilot action zeroed in on crucial areas identified by stakeholders as needing improvement.

Safety took center stage in Egypt, with pilot actions rigorously testing the protocols for crane and truck operators. Meanwhile, Lebanon and Tunisia shifted focus to Safety, Eco-Driving, Stress & Fatigue, specifically for truck operators. Italy, in its own sphere, delved into Stress & Fatigue and Productivity for both crane and truck operators.

In this immersive journey, a total of 40 companies from the private and public transportation sector took part, contributing to the success of 214 trainees who actively participated in shaping the future of the industry.



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5.1 Unveiling the Impact of Technology Transfer Pilot Actions

The heart of the TECHLOG project is seen in the tangible results achieved through its practical Technology Transfer Pilot Actions. Central to these actions was the objective of evaluating and improving the performance of operators, laying the groundwork for advancement and pinpointing pivotal areas for enhancement.

Each partner meticulously crafted a set of performance indicators, a lens through which to measure the transformative journey of operators after undergoing comprehensive simulation training. In Egypt, the focus was on truck drivers, operators of Gantry Cranes, and Mobile Stacking Equipment operators. Indicators like Defensive Driving, Risk Assessment and Mitigation, and Communication Effectiveness were carefully chosen and rigorously tested, revealing significant performance improvements in these crucial domains.

Moving to Lebanon, the focus was on Stress, Safety, and Eco-Driving as performance indicators for truck drivers. The exercise methodology utilized four modes dependent on weather, road conditions, and age, employing pre-and post-simulator driving evaluations. Preliminary results indicate noteworthy shifts in performance, underlining the success of the training interventions.

Tunisian and Italian partners are in the midst of their own performance indicator exploration. In Tunisia, metrics like Distance Traveled, Consumption per km, Time Spent, and Load Weight are under scrutiny, promising insights into the impact of training. Meanwhile, Italian partners are delving into indicators such as Average Speed, Average Fuel Consumption, Fuel Consumption Performance Index, and Truck Coupling Operation Index, among others, offering a comprehensive view of the evolving landscape of truck driver performance.





5.2 Key Insights and Forward Perspectives

• Skill Enhancement:

The training initiative has significantly elevated participants' proficiency in operating container handling equipment and driving trucks as evidenced by their overwhelmingly positive testimonies and improved test results. This newfound competence empowers them to adeptly handle diverse containers, leading to heightened operational efficiency and a reduced risk of accidents or cargo damage within their respective companies and institutions.

• Cultivating a Safety Mindset:

Emphasizing safety in container handling and truck driving, the training curriculum extensively covered safety measures, risk assessment, and emergency procedures. This focus has instilled a safety-conscious mindset among trainees, fostering an active commitment to promoting a safety culture within their workplaces.

• Organizational Advantages:

The successful completion of training programs has translated into tangible benefits for the partnering companies and institutions. Trained individuals have showcased improved skills, contributing to enhanced operational efficiency, minimized equipment downtime, and elevated safety standards. Consequently, heightened productivity, increased profitability, and overall operational excellence have become defining features of these organizations.

• Results of Pilot Actions:

The completion of container handling equipment and truck driving training programs for a total of 214 trainees is a noteworthy accomplishment, indicating a favorable impact on skill development and safety culture within the industry.

Looking forward, project partners remain steadfast in their commitment to delivering exceptional training experiences and evolving programs to meet the industry's evolving expectations. Ongoing collaboration with corporations and institutions will continue, providing sustained support, consultation, and tailored training solutions to enhance container handling and truck driving operations.





6 Sustainable Impact and Future Collaboration

The completion of the TECHLOG project marks the beginning of a sustainable impact on the Mediterranean transport and port sectors. The innovative approaches, shared knowledge, and transformative initiatives established during the project's tenure have set a solid foundation for continued progress.

The enduring impact is not only reflected in the enhanced skills of operators, the establishment of Living Labs, and the adoption of advanced technologies but also in the lasting partnerships forged among diverse stakeholders. The collaborative spirit that defined TECHLOG will continue to thrive as a catalyst for future projects, initiatives, and collaborations.

Looking ahead, the sustainability of TECHLOG's impact hinges on the commitment of its partners and the broader community to embrace and build upon the project's legacy. Continued knowledge sharing, cross-border collaboration, and the integration of technology into training and operational processes will be key drivers of sustained success.

In conclusion, the completion of the TECHLOG project is not an endpoint but a milestone in an ongoing journey towards innovation, collaboration, and excellence in the Mediterranean transport and port sectors. The legacy of TECHLOG will endure through the skills of trained individuals, the knowledge disseminated, and the foundation laid for future advancements. As the Mediterranean region continues to evolve, TECHLOG's impact will be felt in the seamless flow of goods, the efficiency of operations, and the sustained growth of a vibrant and interconnected transport ecosystem.

Thank you for joining us on this remarkable journey. The TECHLOG project may have concluded, but its impact will resonate for years to come, shaping a future where technology, collaboration, and innovation converge to redefine the boundaries of what is possible in the transport and port industries.



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