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# Computational Logistics

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# Preface

Throughout the last decades, the increasing volume of information and operational workload in logistics caused a sharp interest in the automation of physical and informational logistical processes. Companies, institutions, and logistics stakeholders considering this aspect can react more efficiently to changes and disturbances resulting in more accurate planning, extending customer and product individualization while, in many cases, reducing operating costs. This resulted in advances in several logistics sectors, such as maritime shipping, multi-modal transport, urban logistics, warehousing, and inventory management. Computational logistics, as the driver between decision making and operations, has become a key component for economic and industrial growth.

Computational logistics covers the management of logistics' activities and tasks through the joint use of information and communication technologies and advanced decision support and optimization techniques. It is applied in several areas, e.g., the flow and storage of goods and services as well as the flow of related information. In this context, modeling and algorithmic approaches are developed, verified, and applied for planning and executing complex logistics tasks, e.g., for finding the most efficient routing plan and schedule to transport passengers or distribute goods. The models and algorithms are integrated with computing technologies, not only to get satisfactory results in reasonable times but also to exploit interactivity with the decision maker through visual interfaces, and to extract knowledge from data to improve future decision making. This promotes the joint effort of practitioners and scholars for better understanding and solving the logistics problems at hand.

The International Conference on Computational Logistics (ICCL) is a forum where recent advances in the computational logistics research area are presented and discussed. This volume offers a selection of 42 peer-reviewed papers out of the 111 contributions submitted to the this year's edition of ICCL, held virtually at the University of Twente, Enschede (The Netherlands), during September 27–29, 2021. The papers show various directions of importance in computational logistics, classified into five topic areas reflecting the interest of researchers and practitioners in this field. The papers in this volume are grouped accordingly:

## **1. Maritime and Port Logistics**

Maritime and port logistics is the backbone of global supply chains and international trade. The performance and functioning of its related activities are remarkably influenced by the quality of its planning and management. In ICCL 2021, the contributions that fall into this category relate to, among other things, berth allocation, ship routing, bulk logistics, simulation and proactive approaches, and various real-world maritime applications.

## **2. Supply Chain and Production Management**

The management of supply chains (SCs) and production covers different relevant logistics operations such as warehousing, workforce management, lot-sizing,

inventory management, and information sharing. The works included in this category pursue the efficient organization and management of the diverse resources and operations involved in such a way that the production, flow, and storage of products is as efficient as possible. Contributions related to all above-mentioned components, such as warehousing and inventory management, production scheduling, lot-sizing, and other SC-related topics fall into this category.

### **3. Urban Transport and Collaborative Logistics**

The progress in urban transport and collaborative logistics as well as the development of (smart) cities and regions require current systems to be adapted and updated to cope with changes that involve new transportation means, such as drones, the sharing of logistics resources, and collaboration among different logistics operations. The papers in this category relate to a diverse range of topics, such as car- and ride-sharing, drone-assisted delivery, self-coordination of vehicles, and micro-transit services.

### **4. Routing, Dispatching, and Scheduling**

The routing, dispatching, and scheduling of logistics resources constitute an important challenge in real-world transport and logistics activities. Due to numerous specific real-world features, there is a strong necessity for modeling and developing efficient solutions as well as formalizing cases that foster advancements in this area. The papers in this category address, among other things, green pickup and delivery, rerouting and dispatching operations, and service and tour planning approaches.

### **5. Air Logistics and Multi-Modal Transport**

Traditionally, the majority of studies presented at ICCL focus on maritime and road transport. However, nowadays there is an increasing interest in air logistics due to the necessity to operate more efficiently and sustainably. Furthermore, attention is given to logistics problems involving a combination of transportation means, leading to multi-modal transport, where at least two different transport modes are used (e.g., air, water, road, or rail). Thus, the papers that appear in this category relate to a range of topics concerning air logistics and multi-modal transport, such as aircraft routing, gate scheduling, cargo packing, multi-modal transport, and physical internet analysis.

ICCL 2021 was the 12th edition of this conference series, following the earlier ones held in Shanghai, China (2010, 2012), Hamburg, Germany (2011), Copenhagen, Denmark (2013), Valparaiso, Chile (2014), Delft, The Netherlands (2015), Lisbon, Portugal (2016), Southampton, UK (2017), Salerno, Italy (2018), Barranquilla, Colombia (2019), and Enschede, The Netherlands (2020). The editors thank all the authors for their contributions as well as the Program Committee and reviewers for their invaluable support and feedback. Finally, we would like to express our gratitude to Julia Bachale for her helpful support and assistance during the preparation of the conference. We trust that the present volume supports the continued advances within computational logistics and inspires all participants and readers to its fullest extent.

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