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Building a Fluid Goods Mobility System

A Call for Moving Beyond Data Sharing for Supply Chain Visibility

Even after decades of working in the goods mobility industry, we continue to be fascinated by the ability of networks to deliver all types of merchandise in enormous quantities to almost any point of destination across the globe. The secret mechanism

enabling this outcome is the self-organizing nature of the multi-stakeholder goods mobility ecosystem composed of autonomous players operating along the chains across different cultural environments and various legal jurisdictions. Ensuring this high level of delivery performance in the future requires that the mobility industry reengineer its practices and digitize its processes as a collective effort with contributions from all stakeholders involved.

The goods mobility sector is characterized by players that act in strong co-competition, competing in some aspects of the business while at the same time collaborating in other areas. The broad landscape and the dynamics of this situation are more efficiently managed with architectures and applications that provide visibility based on data sharing across the global, regional, and local networks. Establishing this level of visibility has become an increasing aim in the industry over recent years. However, visibility is not an end in itself but needs to result in network-wide synchronization and integration to unleash productivity reserves inherent in the resources and infrastructures deployed. Applying principles of the appointment economy in form of slot management will help to make the best use of a digitized goods mobility system and ensure the fluidity of the system.

The willingness, however, to invest in knowledge, capabilities, and processes supporting this vision has traditionally been limited. Much of the previous improvements have produced suboptimal results by taking only smaller steps rather than bigger leaps that challenge existing patterns of behavior and traditional business models. The verdict is out whether current pressures to innovate, exerted by customers and regulation to mitigate climate change and other risks, will bring broader change across mobility networks through increased investments in talent, digitization, synchronization, and integration. The high freight rates and positive financial results, particularly in the maritime industry, should help to finance some of these investments into the future.

We have been engaged in the goods mobility sector with the goal of making a difference by supporting the efforts of the goods mobility industry towards a connected synchronized and integrated goods mobility ecosystem. Wolfgang, with a strong emphasis on supply chain and logistics innovation, and Mikael with a focus on intermodal supply chain digitization. During the last ten years, Mikael has been deeply engaged in the maritime sector, becoming accredited as the first (adjunct) professor in Maritime Informatics as a collaborative endeavor between the Research Institutes of Sweden (RISE) and Chalmers University of Technology—a collaborative initiative contributing to awareness and knowledge building. Wolfgang has leveraged his substantial experience acquired through working on a global scale as Director for Supply Chain and Transport Industries at the World Economic Forum, as Global Logistics Lead at the strategy firm Corporate Value Associates (CVA), and as President and CEO at GeoPost Intercontinental to drive and pursue strategic investments and partnerships to upgrade capabilities. Mikael is the co-founder of Port Collaborative Decision Making (PortCDM), a concept inspired by Airport CDM (A-CDM) now gaining interest for other types of (multimodal) transport nodes as well. He has also been one of the initiators and leaders for the emerging discourse on Maritime Informatics (www.maritimeinformatics.org) empowering practitioners and academics at a global level to join forces on digitalization with the aim to achieve enhanced coordination and synchronization in maritime operations. Wolfgang is deeply involved in improving efficiency, performance, and the

sustainability of goods mobility systems at the crossroads of innovation and operation, instilling change in large corporates while supporting asset owners and innovators to transform the industry towards digitized practices and models.

Some time ago, we joined forces to explore and drive an industry agenda that puts emphasis on how digitalization can empower stakeholders and improve operational performance through situational awareness and supply chain visibility as the foundation for better decision-making and automation. Our joint work is focusing on multimodal goods mobility actors operating across primarily maritime supply chains, organized end to end from shippers to receivers by beneficial cargo owners, carriers, and logistics service providers. Our shared aim is to augment capabilities and performance across networks through increased synchronization and integration to improve asset and infrastructure productivity. In the process, we have discovered that there is a lot to learn from studying practices applied within and across different nodes and modes on supply chain optimization across different regions and cultures.

Informed by the pandemic-induced disruptions and the resulting volatility and uncertainty across the global economy amplified by shifting consumption and trade patterns, we formed the opinion that many supply chain networks have reached their limits. This is particularly evident in the maritime industry, evidenced by the port congestions that have regularly occurred in different geographical regions. They cause ripple effects across local, regional, and global supply chains, resulting in delays at the point of destination and the various stages along the chains. The aggregated disruptions have not only caused major imbalances in equipment and a spike in container freight rates, but they also significantly reduced predictability and, consequently, the ability of the various actors to plan their supply and inventory and ensure that sufficient capacity is available.

The recent regular congestions that have emerged at Long Beach and Oakland are causing up to three weeks of ships waiting outside the ports with unnecessary utilization of the earth's resources.¹ The congestions also amplify the lack of truck drivers in many parts of the world. The supply chain system cannot afford to have trucks and trains waiting at different sites close to ports but also at strategic inland gateways, like Chicago, for ships to finally make their port visits. Beneficial cargo owners struggle to plan for such a situation. In the meantime, the disruptions ripple across the world. The current relief at Long Beach and Oakland is not the result of improvements of operations but another disruption caused by the pandemic-driven governmental measures that struck some ports in the south of China, which forced them to operate at significantly reduced capacity utilization and performance levels.

An unrelated unfortunate incident that disrupted the supply chain ecosystem was the Suez Canal blockage caused by the container ship *Ever Given* end of March 2021.² Globally operating cargo owners reported that they had limited visibility of their goods en route and the time of arrival at the different destinations post blockage. This incident

¹ Lind M., Lehmacher W., Hoffmann J., Jensen L., Notteboom T., Rydbergh T., Sand P., Haraldson S., White R., Becha H., Berglund P. (2021) Improving a congested maritime supply chain with time slot management for port calls, *The Maritime Executive*, June 29, 2021 (<https://www.maritime-executive.com/editorials/how-time-slot-management-could-help-resolve-port-congestion>)

² Lind M., Lehmacher W., Jensen L., Rydbergh T., Becha H., Rodriguez L. (2021) The Suez Canal puzzle—pulling the pieces together, *The Maritime Executive*, March 31, 2021 (<https://www.maritime-executive.com/editorials/the-suez-canal-puzzle-pulling-the-pieces-together>)

did not only create bottlenecks in ocean transport but also in air cargo between Asia and the United States of America and Europe and even train moves between Europe and Asia.

Today the parties involved, in particular, the cargo owners have limited options to intervene and hardly any chance to prioritize their cargo during such events. Many transport operations, for example, within the maritime sector, which carries more than 90 percent of global trade, are based on the principle of first come, first served. This means that operations are coordinated based on the physical presence rather than on the means of the digital economy, such as the principle of the appointment economy where activities are arranged in planned slots. This, together with limited supply chain visibility, means that the recipients lack sufficient situational awareness about the progress of the movement of shipments, leaving them unable to estimate and influence the time of the arrival of the goods. This also results in severe challenges in planning for succeeding operations, specifically, and the future level of required supply, in general.

Two changes in operating would make a big difference. First, extensive data sharing along the supply chain providing accurate localization information and visibility, improving forecast accuracy to enable the synchronization of the operations of the different carriers such as trucks, trains, barges, and ships carrying the goods. Second, the interoperable integration of systems empowered by digital data-sharing platforms that are home to powerful analytics, allowing to make sense out of the increasing amount of operational and ecosystem data to improve decision-making and automation in the longer run.³

The tide may have turned. We now observe that more and more physical objects are becoming digitally twinned with data fed into larger platforms.⁴ Big data analytics and machine learning provide new opportunities to combine multiple data sources to improve decision-making. In that way, the invisible is made visible through data-informed reports on how different actors are actually performing in respect to their service level agreements. Also, on how potential disruptive events are emerging. Increased supply chain visibility allows decision-makers to take near real-time decisions based on increasing accuracy of information with the progress of the movements of the goods. The latter has been coined sequential analytics,⁵ allowing to make changes of plans as late and as precisely as possible in the process. The closer we get to critical supply chain events, such as an airport visit or the final delivery of goods at an agreed location, the more accurate predictions are possible.

The volume of zettabytes of data generated that is growing at increasing speed allows for enhanced supply chain information and faster and fact-based decision-making. However, this requires that the different actors along the chains share their data, support common data architectures, and invest in building capabilities allowing for the proper selection and use of advanced digital tools and systems.

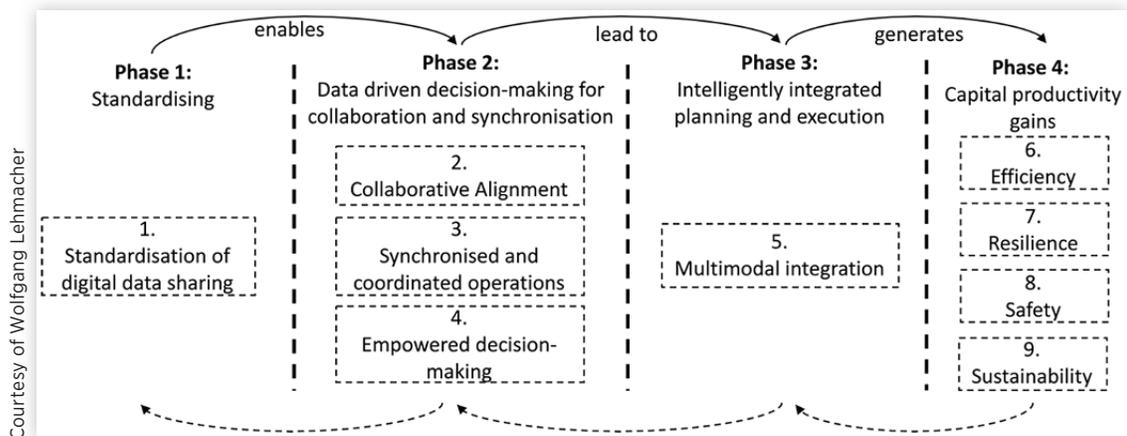
³ Lind M., Becha H., Simha A., Bottin F., Larsen S.E. (2020) Digital Containerisation, Smart Maritime Network, June 18, 2020 (<https://smartmaritimenetwork.com/wp-content/uploads/2020/06/Information-transparency-through-standardized-messaging-and-interfacing.pdf>)

⁴ Lind M., Becha H., Watson R.T., Kouwenhoven N., Zuesongdham P., Baldauf U. (2020) Digital twins for the maritime sector, Smart Maritime Network, July 15, 2020 (<https://smartmaritimenetwork.com/wp-content/uploads/2020/07/Digital-twins-for-the-maritime-sector.pdf>)

⁵ Warren P. (2021) Reinforcement Learning and Stochastic Optimization: A unified framework for sequential decisions, Castle Labs, Princeton University (<https://castlelab.princeton.edu/RLSO/>)

Capacity building on global scale will take time. We also need a number of mindset shifts. The value of data does not emerge through holding onto it with the hope to be able to monetize one's own data in isolation and for the individual interests. The value of data unfolds once it is shared. This, particularly in form of efficiency gains through synchronization and integration across supply chain networks (see figure below). Data allows the various players to engage in digitally empowered collaboration to unlock hidden asset productivity ([Figure 11.1](#)).

FIGURE 11.1 Maritime Informatics enablers and expected effects. Lind M., Watson R.T., Lehmacher W. (2021) Key steps towards a high performing maritime industry, Container-News, March 27, 2021 (<https://container-news.com/key-steps-to-a-high-performance-maritime-industry/>) (www.maritimeinformatics.org).



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Standardized digital interfaces and collaborative alignment and processes are essential to allow for the integration of systems and augmented performance among the episodic coupled actors, for example, when a carrier visits a critical node. New knowledge is required to realize the vision. The digital transformation efforts start with raising awareness about benefits and opportunities. Yet about 80% of the ports in the world have not established or are not even planning to build the respective digital capabilities to allow for implementing digital architectures, systems, and applications that would allow them to synchronize port visits and optimize the utilization of infrastructure and resources along the goods value chains. Digitization of the goods mobility ecosystem requires an inclusive approach. If we fail in this respect, 80% of the maritime world will fall further behind.

On an International level, there are efforts made towards establishing digital performance indexes for ports and other types of transport nodes. Such indexes would both drive the digital inclusion for the nodes of the world and provide the foundation for a focused discourse and action plan on building capacity and digital capabilities. Sharing experiences among the different modes of transport would also inform the new thinking across the different goods transport systems.

How can we join forces to drive change across goods mobility systems and practices globally? There are many Wolfgangs and Mikaelas out there in the industry that can support the larger goods mobility community in their efforts to raise their level of awareness and understanding around the new possibilities brought about by the

digital economy. While the change will result from industry-wide knowledge exchange, as well as collaborative and open innovation, the breakthrough also needs common standards for interactions that are brought into use. Standardization bodies play an important role in the process. But what really counts is large-scale adoption of new technologies and the willingness to reengineer current practices in a way that they make optimal use of the new solutions and possibilities that are emerging. Initially, much of the effort needs to focus on instilling confidence and courage among business leaders and policy makers to pursue the necessary investments and initiatives to build capabilities and establish a truly digital environment as the basis for a new quality of economic growth in the interest of the economy and the common good. One major step towards this goal would be securing that coordination and synchronization within the supply chain is pursued without assets, like trucks and ships, being physically present.

Our aim is a global call for slot management at large⁶ to be adopted for the different types of goods mobility systems to ensure the fluidity of the flows of goods. Unchoking the current goods mobility systems and their sustainable expansion requires a radical rethinking of current behaviors, practices, and models. We are convinced that a slot management approach across all nodes and modes allowing for near real-time status and progress updates would significantly increase the fluidity of the flows of goods and improve the use of resources and infrastructure deployed along the chains. We consider the realization of slot management practices as a major step forward for carriers, forwarders, and cargo owners to also raise their influence on supply chain decisions in their own and their customers' interest. Better synchronization and integration will also result in reduced carbon emissions, which would benefit our society and future generations. Building a fluid goods mobility system includes that we avoid paving the cow paths by introducing digitalization just as a means to cement existing inefficient patterns of operations rather than building better systems.⁷

About Wolfgang Lehmacher

Wolfgang Lehmacher is a global supply chain and technology strategist. He gained over 25 years of industry and leadership experience as an executive and consultant in organizations worldwide. He is advising and actively supporting corporates, asset owners, international organizations, governments, and startups. Wolfgang was Director of Supply Chain and Transport Industries at the World Economic Forum in New York and Geneva, Partner and Managing Director for China and India at CVA in Hong Kong, President and CEO at GeoPost Intercontinental in Paris, and

⁶ Lind M., Lehmacher W., Jensen L., Notteboom T., Rydbergh T., White R., Becha H., Rodriguez L., Sand P. (2021) Resolving the ship backlog puzzle in the Suez Canal: Predicting ship transits in capacity-constrained areas, The Smart Maritime Network, April 22, 2021 (<https://smartmaritimework.com/2021/04/22/resolving-the-suez-backlog-predicting-ship-transits-in-capacity-constrained-areas/>)

⁷ Lind M., Becha H., Simha A., Larsen S.E., Ben-Amram E., Marchand D. (2020) The maritime ecosystem needs ecosystem innovation to avoid "paving the cow paths", The Maritime Executive, December 12, 2020 (<https://www.maritime-executive.com/editorials/maritime-ecosystem-needs-innovation-to-avoid-paving-the-cow>)

Head of Eastern European and Eastern Mediterranean Regions, and Country General Manager Switzerland, at TNT. He is the advisory board member of The Logistics and Supply Chain Management Society in Singapore and Ambassador of the European Freight and Logistics Leaders Forum. He is a Founding Member of the Logistikweisen, a logistics expert committee under the patronage of the German Federal Ministry BMVI, and NEXST, a think tank initiated by Reefknot Investments, Kuehne + Nagel, and SGInnovate in Singapore.

About Mikael Lind

Dr Mikael Lind is (Adjunct) Professor in Maritime Informatics at Chalmers University of Technology and Senior Strategic Research Advisor at RISE. He has initiated and headed a substantial part of several open innovation initiatives related to ICT for sustainable transports of people and goods. In his capacity as the world's first professor in Maritime Informatics, he is also part-time at the Chalmers University of Technology (M2), Sweden, exploring the opportunity of maritime informatics as an applied research field. Lind serves as an expert for World Economic Forum, Europe's Digital Transport Logistic Forum (DTLF), and UN/CEFACT. He has been the lead author of many concept notes associated with maritime and transport informatics brought up by the international trade press and has become a recognized thought leader in Maritime Informatics. Lind has also served as mini-track chair for Maritime Informatics at the major regional IS conferences in Europe and the Americas for several years.