

Managing pain points in end-to-end supply chains

- VWT article #1: How a new networked solution may revolutionize risk management

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The digital solution to manage supply chain disruptions through VWT

Goods shipped by Northern Forests (fictitious name), a Swedish-Finnish company in the healthy lifestyle business, are on their way through international transport corridors towards a warehouse of furniture distributor Bestlife (fictitious name) in Australia. Thanks to digital twinning of trucks and ships, and other infrastructure, e.g., at various ports along the route, the actors of the maritime industry enjoy a high level of situational awareness, and pre-planned contingencies. Most actors have since long understood the benefits of data sharing and descriptive, predictive and prescriptive analytics as these allow them to follow and understand what is happening at almost every place and space across the (global) supply chain network, which is the ecosystem of commerce, a fact that became evident during the Covid-19 pandemic. Networked systems alert actors when potential disturbances and disruptions are detected. These systems are platforms of exchange and collaboration for collective problem-solving. Such systems-of-systems empower actors to assess individually and collectively critical situations in ports and on route and augment their decision-making capabilities through contextual, location, and event data, and pictures of probable futures. All these culminate in sets of prescribed options by means of ranked recommendations generated by powerful algorithms. Such systems reduce losses, delays, costs, and greenhouse gas (GHG) emissions. Business and society benefit through digitally empowered collaboration and value creation.

This is the future we have in mind. Digitalization and collaboration are means to an end, and not an end in itself. Furthermore, we see a strong link between the two components and believe in the enormous potential of increased [collaboration and digitalization for economic and societal value \(CDES\)](#). CDES-based systems are symbiotic and self-reinforcing: digitalization requires and empowers collaboration, while societal (intellectual, social, environmental etc.) capital is the prerequisite for generating economic capital (wealth, return on investment (ROI), profit etc.). This hypothesis provides a strong rationale for collaboration and digitalization across end-to-end supply chain systems.

This belief drove the creation of the Virtual Watch Tower (VWT) community, a diverse group of actors of the global supply chain ecosystem that has joined forces in an initiative led conjointly by Research Institutes of Sweden (RISE) and Institute of High Performance Computing (IHPC)/Agency for Science, Technology and Research (A*STAR) to prototype and test a networked system-of-systems to better manage supply chain disturbances and disruptions in today's world of VUCA (Volatility, Uncertainty, Complexity, and Ambiguity). This contribution describes the first step taken by the community which has been the selection of pain points and use case for the shipper-driven, port-centric VWT network solution.

The cargo owners' pain points

The overarching struggle called out by cargo owners in numerous conversations and working sessions results from the lack of visibility particularly when disruptions emerge. These disturbances include the

lack of availability, delays of containers and other equipment at origin, blank sailings, restrictive or changing port entries for laden containers, inaccurate/obsolete transport schedules, updates that occur only days before arrival, lack of location data and estimated arrival times (ETAs), congestion and capacity crunch at transportation nodes, uncertainty of impact of disturbances and disruptions on GHG emissions, and lack of information on events like natural disasters and labor conflicts.

If disturbances and disruptions are managed properly cargo owners and other actors can first, benefit from significant cost savings, while second, increasing customer satisfaction and retention which together drive topline and bottom-line growth. Benefits include avoidance of expensive emergency air transport, freed up capital, and more precise emission data to achieve compliance and differentiation. Also, society gains through reduced emissions resulting in improved health of citizens. At the core of the solution sit visibility and situational awareness brought about by digital means, which are a prerequisite for managing disturbances and disruptions which are frequently occurring across global supply chain networks.

The root cause of the challenges

The main cause identified is the lack of collaboration across supply chain networks. A fact that the industry has been discussing for a long time. Each actor optimizes their own operations, often placing costs and profits above reliability. This, not only because of economic considerations but also because it is very hard to take a holistic view without overall situational awareness and lack of quantified evaluation of the benefits of collaborative intelligence. Furthermore, often it is the means of transport that is the unit of analysis rather than the cargo itself. Bringing intelligence through visibility to the world of supply chains requires willingness and engagement. But it does not end there. This situational awareness needs to translate into better decision-making which requires pooling of accurate data and collaborative efforts to reach the right interpretations and conclusions in our world of a self-organizing fragmented supply chain network ecosystem. This then needs to be executed through pre-committed and viable recovery options, orchestrated at opportune locations, such as the ports of call along a cargo/ship journey. Empowering a community through collaboration and digitalization is exactly what motivated the creation of the VWT community with the launch of the VWT network project.

An open system-of-systems solution

RISE and IHPC/A*STAR took initiative and established the VWT community, collectively leading the project. The approach is open and dynamic with a community that is expected to grow continuously. The community is built around the intelligent digital “middleware” that connects the VWTs installed within the organizations of the different members of the VWT network community. The system-of-systems will empower the community and augment the ability of all members to better manage risks across the global supply chain network. In an initial step the cargo owners engaged in the project have selected the use case along a specific corridor between Asia and Europe.

The networked [VWT is a digital architecture and digital platform](#) at the center of a community that co-develops and co-uses the solution. The system has the ability to neutrally aggregate and compute data, and enable collaboration to help companies, such as cargo owners and ports to manage risks, disturbances, and disruptions but also their transport and logistics chains more efficiently. The VWT offers enhanced visibility and intelligence generated by authorized access to the combined data lake of the members of the VWT community. They also provide the VWT with analytical power pooled in the network of VWTs. Enhanced data lakes and consolidated computing power allow for improved

accuracy of results as the basis for enhanced discussions and collaboration organized in pop-up virtual situation rooms provided by the VWT middleware.

The VWT project is supported by a range of industry partners and advisors. This includes cargo owners/transport buyers like Alleima Tube, BDP International, Einride, Ericsson, Scania, and Stora Enso; logistics value chain services providers like PSA International, MSC, Green Cargo, Wallenius SOL, and Yilport; technology firms and equipment manufacturers such as Cargotech with Kalmar and Bromma, HERE Technologies, Marine Benchmark; and knowledge partners like Gothenburg University, Chalmers University of Technology, Stockholm Environmental Institute (SEI), and Umeå University. Kvarken Ports, Port of Gävle, Helsingborg Port, and Swedish Ports Association are also part of the emerging VWT ecosystem. The community represents main parts of the ecosystem but has lots of room to grow and new members will be onboarded over time. The system is open and willing to strongly consider any kind of support and participation in the initiative.

The VWT will analyze large amounts of data from various sources to provide situational awareness around cargo and the ecosystem through which the merchandise is carried, produce situation reports, disturbance/disruption alerts and (alternative) recommendations on how to mitigate identified risks. The system will manage the security, integrity and ethics of data sharing, analytics, services and the entire solution through the use of best-in-class practices and technology, good governance and agreements (e.g., project agreement and powers of attorney for data sharing), define business models and incentives for using the system, sharing data, and expanding the range of services, and explore behaviors and the impact of different cultures across the community on collaboration and digitalization in the interest of optimal operations of the VWT network.

We are at the beginning of an important development. While the technologies used can be considered mature, the VWT concept and the VWT solution itself is yet in a nascent stage. The VWT community will build and test a prototype answering critical questions on rules of engagement and governance, data types and protocols, and the code of conduct that determines the way of collaborating across the community and beyond in the process of prototyping.

Mitigating risks

Despite all good intentions a shared awareness and collaboration solution is not easy to establish. The latest failure of such an initiative in the maritime industry has been the shutdown of Tradelens. Although the joint venture between A.P. Moller - Maersk (Maersk) and IBM had managed to obtain commitments for over 50 percent of the global shipping container volumes the shareholders announced the discontinuation of the platform for visibility and document digitalization [due to lack of commercial viability](#) in November 2022.

Many believe that such a system needs to be impartial and carried by a spirit of collective effort and benefit sharing. Although any kind of pioneering should be appreciated by anyone, a networked system of such scale based on data sharing should not be owned or controlled by one or a few privileged actors. Ensuring neutrality of the operating entity is considered a critical success factor for such solutions. The right structure and good governance are paramount when different parties work vertically, horizontally, and diagonally together. Such solutions require a true partnership. The VWT project as it has been kicked-off is conceived as a decentralized and neutrally led initiative at the beginning of a journey towards increased collaboration and digitalization for economic and societal value.

Conclusion: Quo vadis and next step

The transport system is a shared “infrastructure” for cargo owners. The supply chain is the ecosystem of commerce. An end-to-end logistics value chain is seldom used by only one cargo owner. This means that individual units of one owner can impact other units of different owners, loaded on a particular vehicle, at a specific node. The disturbances may result from undeclared hazards in one container, the delay of a feeder, or a ship that is stuck in the Suez Canal. Digitalization and collaboration allow that such situations can be predicted or immediately identified, its potential evolutions, consequences, and impacts rapidly assessed, and options timely pre-developed, so that the most optimal solution can be availed to the (ad hoc) community that shares the same destiny.

The concept of the virtual watch tower is not new. But yet it has not been combined with collaborative mechanisms to effectively manage supply chain risks and disruptions at scale. That’s exactly what the VWT initiative envisages. The VWT will be developed and evaluated based on historical data and tested with real data from real parties involved in real large scale supply chain operations. In the initial project phase of two years, the VWT consortium will develop a prototype, understand how the different components of the solution like a digital pop-up situation room for exchange and collaboration can work, what governance mechanisms are required to ensure that the interests of each participating party are protected, and how incentives have to be structured to ensure the financial viability of the solution in the years to come.

We live in a world of VUCA. Collaboration and digitalization are key components to manage our volatile, uncertain, complex, and ambiguous times. But the idea goes further. The CDES concept helps us to address our economic concerns but also to tackle the global challenges like climate change and the pollution of the oceans. What we can’t see, can’t be managed. Digitalization gives us better senses. Together we are stronger than alone, which is particularly true in a fragmented self-organizing system like the global supply chain network where the output of the whole depends on the performance of the weakest link in the chain. The VWT approach can not only serve the supply chain sector but any industry and every part of human society.

This article informs about a new solution in development that can bring significant improvements to the supply chain sector which is the ecosystem of commerce. It takes a holistic approach through not only providing the digital “middleware” for collaborative intelligence but building the community that shapes the solution in the spirit of solidarity. As an open impact system for the benefit of its initiator, builder, and user community, the VWT network invites actors of the global supply chain ecosystem to join and participate in the effort.

About the authors

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