KUEHNE+NAGEL

Healthcare Logistics

Digital lane risk assessments: redefining healthcare logistics for precision and resilience

Mitigating shipment risks

Hot off the press at our corporate headquarters by Alexander Draken, Global Air Logistics, Innovation Lead

In an era where precision and resilience are paramount, healthcare logistics faces unprecedented challenges in ensuring the safe and timely delivery of critical shipments. Enter the digital lane risk assessment (LRA)—a groundbreaking approach that leverages advanced technology to mitigate risks in supply chains.

By harnessing the power of data analytics and IoT technologies, digital LRAs offer insights into potential risks along transport routes—critical for ensuring that sensitive healthcare products reach their destinations intact, on time, and without compromising product integrity.

What is digital LRA?

At its core, a digital LRA is the combination of industry standard risk management methodologies e.g. ICH Q9 to identify hazards and to analyse and predict risks along transport routes—whether road, air, or sea. For healthcare logistics, this goes beyond merely considering traffic or weather conditions. It integrates factors such as:

- Environmental variables crucial for temperature-sensitive drugs and biologics.
- Supply chain vulnerabilities like transportation bottlenecks or special customs procedures.
- Operational risks including compliance, regulatory, and security issues.

With these inputs, digital LRAs can provide insights into where, when, and how a particular lane might expose shipments to potential risks, enabling logistics teams to proactively adjust routes and avoid costly disruptions.

Why healthcare logistics needs digital LRAs

The healthcare sector faces unique logistics challenges. The timely, secure, and compliant delivery of medical supplies can impact patient health, especially as many drugs and devices are sensitive to environmental conditions and handling protocols. Any delay, diversion, or environmental exposure can render these products ineffective or even dangerous. With digital LRAs, healthcare organisations can:

Ensure product integrity
by tracking environmental conditions dynamically, adjusting routes, and optimising refrigeration and packaging based on indications from real-time data.

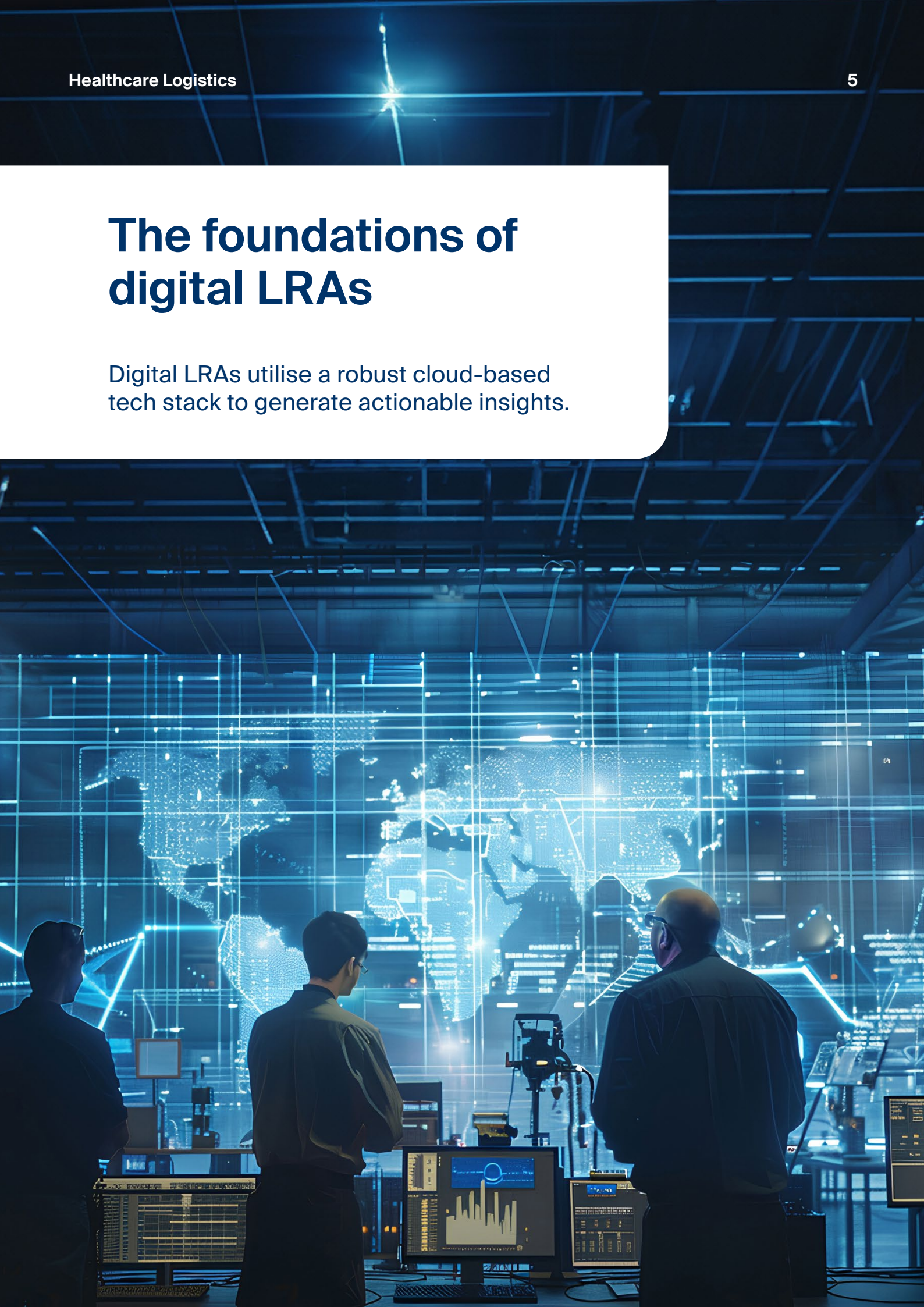
Minimise compliance risks
by considering regulatory requirements, customs processes, and other compliance data for each route ensures conformity with regulations.

Mitigate security threats
by assessing which routes pose higher security risks and implement real-time monitoring and adjustments to avoid exposure.

Improve cost efficiency
by giving logistics teams the visibility necessary to select the most efficient, low-risk routes in advance.

The foundations of digital LRAs

Digital LRAs utilise a robust cloud-based tech stack to generate actionable insights.



Key components include:

IoT and sensor integration
IoT devices enable the continuous monitoring of assets in transit, capturing real-time temperature, location, and handling data. These sensors can feed information back to central systems, allowing teams to immediately react to deviations from safe parameters.

Reliable data structure
For a proper assessment, the capabilities need to reflect the actual environment and services of the air-lines, airports, sea carriers, ports, and geographical areas for road transport. With this data the infrastructure, and more specifically temperature-related competencies, can be investigated.

Continuous consumption of external data
Automatic inclusion of external data, such as climate data or other data that help detect patterns in PESTLE* factors, supports analysis and improves the output.

Structured quantifiable approach
A structured grading system is essential for a quantifiable approach. Manual data should not be trusted; instead, use a dedicated digital tool that provides a clear, consistent, and repeatable system for performing digital risk assessments.

*Political, economic, social, technological, legal, environmental

How Kuehne+Nagel mitigates the risks

Kuehne+Nagel has developed Risk Mitigator, a digital tool which automates a cumbersome manual process. The tool collects and analyses data—both our own data and data from our vast network of carriers—to produce comprehensive risk assessments and mitigation strategies, enhancing visibility and control over critical control points in the supply chain, making it possible to assess potential threats along the different routes.

When an LRA is initiated, Risk Mitigator considers additional information, such as product sensitivities or specific guidelines, to refine the outcomes. The output report defines the impact and likelihood of each type of risk, making a more informed decision possible.

A comprehensive assessment of risk at every touchpoint

The supply chain is divided into different touchpoints, such as handling, build-up, tarmac time, air transport, and so on. At each touchpoint a different party handles the cargo—either physically or in terms of documentation. The Risk Mitigator tool gathers data from each touchpoint and party. For example, the airlines are checked for high-value storage capabilities including availability and size of cage or vault storage. The tool also automatically collects information, such as climate data and temperature extremes.

The individual segments of the LRA are connected to build the big picture from pick-up to final delivery. All necessary information is loaded into the LRA from each party at each touchpoint. Once compiled, the tool produces a user-friendly summary with the risks graded and highlighted. Details for potential mitigations are proposed for the different risks.

The logistics experts at Kuehne+Nagel and you jointly decide on a strategy to apply for each of the detected risks: accept, avoid or mitigate.

Once this decision has been made, Kuehne+Nagel offer guidance and tangible actions to lower the potential risks.

The Risk Mitigator tool helps you prepare for risks such as:

- Temperature excursions
- Mishandling of cargo
- Trucking incidents such as theft or vandalism
- Detrimental effects caused by delays

The Future of digital LRAs in healthcare logistics

As healthcare logistics continues to evolve, digital LRAs will become indispensable. Beyond mitigating current risks, they offer predictive insights that help organisations prepare for and adapt to future challenges, such as regulatory changes, environmental shifts, and market demands. The vision for the future is a logistics ecosystem that doesn't just react to risk but anticipates and eliminates it—ensuring patient safety, regulatory compliance, and operational efficiency.

By leveraging digital tools, such as Risk Mitigator, healthcare providers and logistics teams can better navigate today's complex, interconnected supply chains and ensure that life-saving medications, devices, and equipment reach patients precisely when and how they're needed.

In the future, AI and machine learning will further enhance this capability. Predictive algorithms using historical and real-time data will identify potential risks along a lane. Over time machine learning models will refine their accuracy, identifying complex patterns and new risk factors that would otherwise go unnoticed.

About us

With approximately 80,000 employees at almost 1,300 sites in close to 100 countries, the Kuehne+Nagel Group is one of the world's leading logistics providers. Headquartered in Switzerland, Kuehne+Nagel is listed in the Swiss blue-chip stock market index, the SMI. The Group is the global number one in air and sea logistics and has strong market positions in road and contract logistics.

Kuehne+Nagel is the logistics partner of choice for 400,000 customers worldwide. Using its global network, logistics expertise and data-based insights, the Group provides end-to-end supply chain solutions for global companies and industries. As a member of the Science Based Target Initiative (SBTi), Kuehne+Nagel is committed to sustainable logistics by reducing its own environmental footprint and by supporting its customers with low-carbon logistics solutions.

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