



# How Humans and Robots Collaborate for Peak Performance

Unlocking warehouse potential with AI



Robots can never replace humans



War and inflation fuels turmoil



High turnover rates prevent growth



Life in an automated warehouse  
"Come to work with me"



Automated warehouse  
How it works



Succeed with the right software



Where to start?



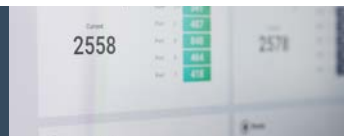
Online pharmacy use  
piece-picking robot with AutoStore



Warehouse automation in 2030



A data-driven future



Robots save lives



The key to growth



# Robots can **never** replace humans

The last years have been significant for intralogistics. First, the pandemic skyrocketed the demand for online shopping. Then, a financial recession occurred, leaving most people with less money to spend online. In addition, war and natural disasters led to a shortage of several products.

**The demand for adaptable and expandable warehouse solutions is more critical than ever. To meet this demand, automation is an essential factor.**

In this whitepaper, we share insights on what it takes to succeed with automated workflows and how humans and robots can work together to achieve productivity and growth.

The most important takeaway is that while humans are not designed to handle repetitive, “boring” tasks all day, robots excel at it. Nevertheless, it is crucial to acknowledge that human skills and abilities are still vital for ensuring an efficient and effective warehouse environment.

Over the past century, technology and automation have transformed both our work and personal lives. More recently, the widespread adoption of artificial intelligence (AI) and robotics has further revolutionized various aspects of our society.

AI makes it possible to do things we could never even imagine before. Like providing life-changing tools for individuals with disabilities, unlocking our cellphones with face recognition, or asking services like ChatGPT about anything.

This technology has also entered the warehouse. The synergy between robots and humans results in exceptional customer experiences that foster customer loyalty and generate favorable word-of-mouth referrals.

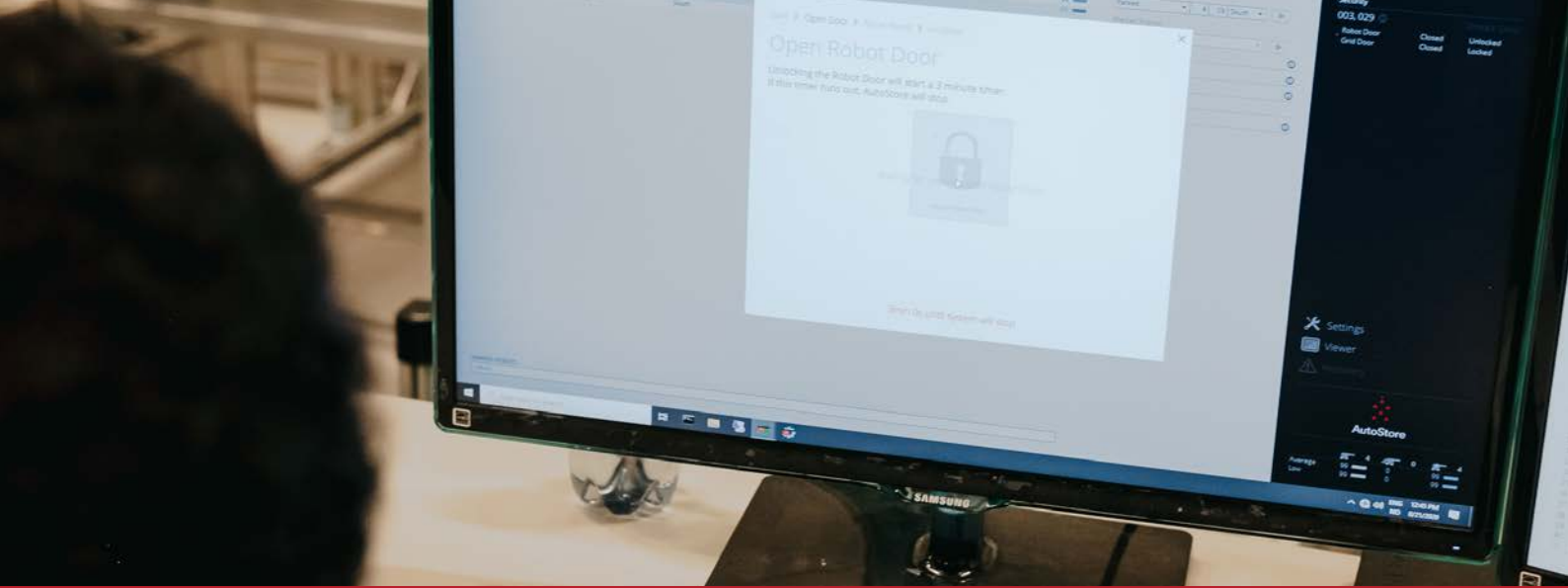
The following pages will detail how an automated warehouse can provide an enhanced and more efficient workday for employees. As it turns out, humans and robots make an excellent team.

Enjoy your reading!

Best,



Nikolaj Bjørn Eriksen  
Managing Director  
Element Logic Denmark



# War and Inflation Fuels Turmoil



**“During my first warehouse visit to promote automation, workers were protesting outside against its implementation.” – Isabelle Dubois Bion, Managing Director, Element Logic France.**

That was four years ago.

**“Today, most warehouse workers see the extensive benefits to their physical and mental wellness,” Dubois continues.**

In just a few years, the perception of warehouse automation has shifted from being a threat to warehouse jobs to being embraced as the future (and present) of warehouse automation.

This fast shift traces back to the rise of eCommerce

during the pandemic and the ever-increasing customer demands for quick deliveries. If your deliveries are slower and you make wrong pickings more frequently than your competitors, it is unrealistic to anticipate your business to thrive.

The increase in eCommerce slowed down and stabilized at the beginning of 2022. At the same time, challenges in global logistics, natural disasters, and the war in Ukraine led to a shortage of essential materials and

products. Furthermore, the inflation rate increased the price of everyday items like bread and milk simultaneously as the cost of electricity skyrocketed in many countries.

Consequently, most people have less money to spend on shopping – both online and in physical stores. This affects warehouses worldwide. Especially companies that have come to rely on pandemic-related growth to maintain their current level of success to survive.

**So how can warehouses adapt to market fluctuations while meeting the increasing customer demands?**

“Automation and being an early adapter of new technology is undoubtedly the answer,” Dubois states.

Warehouse automation enables you to use flexible and modular solutions to handle an unpredictable market. Automation is the safety net that secures the future of your business.

There won't be any additional fees if robots are temporarily sidelined due to a decrease in orders, waiting for customers to return. If your sales increase, new robots can be deployed to handle the pressure. You can also easily expand the grid in your existing solution.





**30 SECONDS**

**At Boozt, the record time from placing an order to dispatching it from the warehouse is just 30 seconds.**



# High turnover rates prevent growth

**Fifty years ago, most people chose a job for life. They spent their entire career in one place and were extremely loyal to their employer. Today, the situation has changed significantly.**

We frequently switch careers, possessing a heightened awareness of our deserved compensation and perks. Additionally, we pursue greater diversity, recognition, and satisfaction from both our career and our employer.

This results in high turnover rates in workplaces where tasks are repetitive and there are no real growth opportunities.

This is the case for most manual warehouses and as a result they report increasing turnover rates and a high volume of temporary and seasonal workers. Another common challenge in physically demanding jobs, like in a manual warehouse, is the

growing number of sick leaves and burnouts among workers. Frequent onboarding of new staff and a rising number of sick leaves put an effectual stop to business growth.

“In an automated warehouse, the work is more rewarding and causes fewer injuries and burnouts. Employees report an improved work-life balance, more energy, and maybe most importantly – excitement about work,” Dubois says.

“As the salary is equal, the added benefits make it clear that workers prefer, and remain, longer in automated warehouses,” she continues.



# Learning the new workday

Many warehouse workers are skeptical of automation due to its perceived complexity and fear of being unable to operate the AutoStore solution.

Luckily, this fear is unsubstantiated. The basic training to operate the ports and pick orders is completed in less than an hour. A selected few are trained to become Super Users. They learn the

more advanced settings and how to handle complex scenarios and potential issues.

The technology is cutting-edge and intricate. However, the workflow and the user interface are intuitive and easy to use, no matter your understanding of technology.





# Life in an automated warehouse “Come to work with me”

**“To test the efficiency of AutoStore, I placed an order, and it was ready for pickup in just two minutes,” Kjetil Evensen says.**

**Kjetil works in the warehouse at the Norwegian company Bildeler.no, where he picks and pack orders consisting of various car parts.**

One year ago, Bildeler.no automated its warehouse with Element Logic – **changing Kjetil’s workday altogether.**

“I was so much more stressed before! After a day of printing lists, picking orders, climbing stairs, and packing items, I left work feeling completely exhausted.”

“Now, the robots pick orders while I pack and prepare them at my station. The difference in productivity is remarkable, with the system enabling us to process significantly more orders each day compared to a year ago.”

Bideler.no can also offer a more

comprehensive product range as the automated system increased its storage capacity considerably. As a result of the extended product range and faster deliveries, Kjetil notes an increase in returning customers.

“The robots are not the best colleagues at the Christmas party, but they are great colleagues in the warehouse. They always deliver, make no errors, and flawlessly perform all the repetitive and tedious tasks.”

Kjetil Evensen, warehouse worker, Bildeler.no

### **“I have more fun at work”**

One might assume that going from an active workday to an ergonomic workday with less movement results in less interaction with your colleagues.

“The opposite is true. We have never had more fun at work than we do now. We are more energized, and the tasks feel more rewarding.” Kjetil explains.

Kjetil and his coworkers alternate between working at the carousel ports connected to AutoStore and the manual section of the

warehouse, where they handle products that cannot fit into the AutoStore bins.

There are several ports next to each other, and there is always time to chat about the weather or plans for the weekend.

“Sometimes, we talk about how it would be to return to a manual warehouse. We all agree it would be boring.”

### **Enable, not replace**

It is scientifically proven that humans are not wired to do repetitive tasks for seven



## Why Kjetil prefer an automated warehouse

- No more running around all-day
- No more climbing stairs all-day
- Less heavy lifting and physical strain
- More energy
- More fun at work
- More interesting work tasks
- New technology skills
- Improved work hours



hours a day, five days a week, 12 months a year. We get tired, bored, sick, injured, lose concentration, and make mistakes.

In the past, this was the only option, but now we can automate these tasks and allocate humans for tasks that align with their capabilities.

Humans cannot even dream of reaching the same productivity levels as robots when picking orders. Robots, on the other hand, cannot do critical thinking, understand the customer journey, interpret patterns and needs, be creative, do quality control, or find new value-adding tasks to help the company grow.

While some still fear that automation will replace humans, it actually creates a more valuable and productive work environment.

At Bildeler.no, automation and robots have made it possible to grow and gain even more loyal and satisfied customers.

**After automating its processes, Bildeler.no has not laid off any employees. Instead, Kjetil has gained a new human colleague to help manage the influx of orders.**

“I am confident that we will continue to grow. With more processes being automated, we will be able to serve a greater number of customers and will require additional personnel to oversee robot operations and manage the ports,” Kjetil predicts.



## The first robots to imitate humans...

... were built in the 1930s. However, we are still far from replacing humans with robots. According to Harvard economist James Bessen, the elevator operator guiding people to the correct floor in a manual elevator is the only job that has been fully replaced by robotic technology.



# Automated warehouse

## How it works

**At Element Logic, we believe in the power of human-robot collaboration for peak warehouse performance.**

The hardware core of our warehouse solutions is AutoStore, the fastest order fulfillment system in the world with a modular design making it easy to scale up and down depending on your needs.

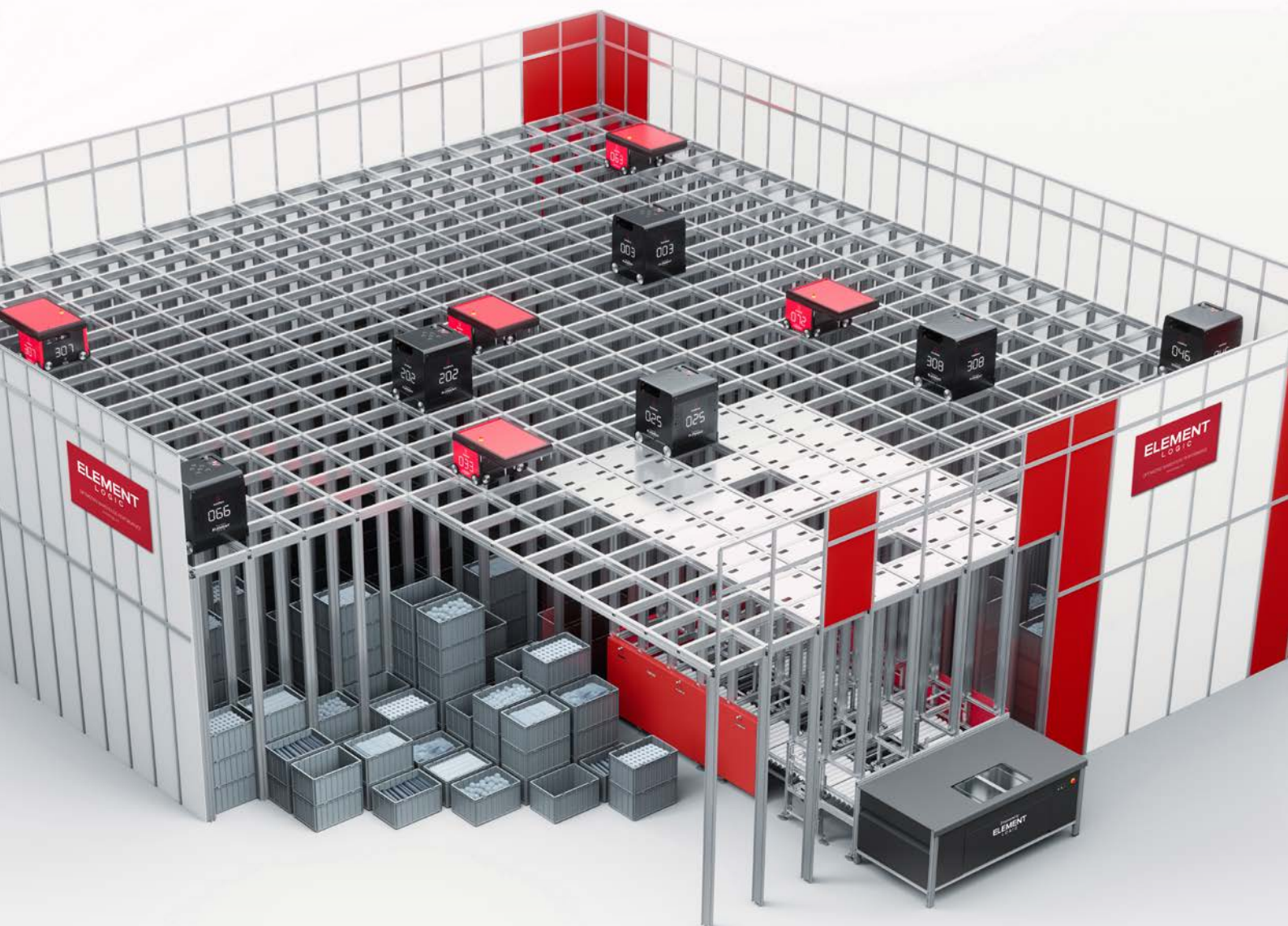
AutoStore consists of an aluminum grid built to fit your space. Inside the grid, bins contain your inventory and are stacked on top of each other. A database has complete control over the content of each bin at any given moment.

The robots navigate on top of the grid to collect and transport goods using the most efficient routes possible. They operate non-stop, 24/7, and recharge automatically when necessary.

Just outside the grid, you find the ports where the picked goods are delivered for further handling by an operator. There are different ports for different needs. The most popular port is the Conveyor Port with a conveyor belt. Other types of ports include Carousel Ports, Fusion ports, Swing Ports, or Relay Ports.

The AutoStore Controller is in charge of planning and executing all AutoStore tasks in the system. It communicates to all modules and keeps track of every movement. Logs are created by the Controller and are continuously transferred to secure storage in an external database.

The system optimizes itself continuously for your operations. For example, items frequently asked for are automatically placed in the upper bins to shorten the access time.



# Succeed with the **right software**

What makes a warehouse solution by Element Logic truly unique is the synergy between the hardware like AutoStore, conveyors, AMRs, picking robots and the specialized software developed in-house by our experts.

Combined, this provides a fully interconnected ecosystem of data-driven software solutions.

## The software that unlocks the full warehouse potential:

### eLogiq

A data platform that collects, integrates, and processes data from multiple sources. It provides you with valuable warehouse performance insights, analysis, and predictions. By combining data from numerous sources, we empower you to avoid negative trends, view benchmarking, and tweak processes so you can optimize your warehouse and stay competitive.

### eManager

The brain of AutoStore. eManager is our warehouse execution, management, and control system for AutoStore. eManager optimizes and manages AutoStore warehouse performance from goods receipt to outbound processes and enables you to maximize the efficiency of your AutoStore warehouse processes, boost productivity, reduce costs, and improve end-customer satisfaction.

### eController

The software toolbox for simulating automated warehouse workflows and integrating automated equipment, including conveyor systems, box erectors, packing machines, and more. eController offers extended control of the movement of goods and orders throughout your warehouse.

### eOperator

Our robotic piece-picking technology runs on our software eOperator. The robotic arm integrates with AutoStore and handles orders automatically. By incorporating eOperator into your warehouse operations, you can achieve secure and accurate picking, cost-effective labor, and a streamlined supply chain with a high level of profitability and fast ROI.





# Where to start?

**Not all businesses will benefit from investing in all available automation technology simultaneously. It depends on your industry, number of employees, customer base, and growth goals.**

“Those who are considerate about their careers and companies that value their future must closely monitor new technology trends and adapt to changes. It is wise to adjust your strategies and operations proactively rather than waiting for external factors to force you to do so,” Timo Eberhard says.

Eberhard is the Head of Digital Transformation & PMO at Element Logic. He has previously helped navigate the implementation and adoption of new technologies in the aviation industry like automated inspection or shop floor processes.

“Warehouse automation is still in its early stages, but the growing need to

meet customer demands is driving more businesses to adopt it,» Eberhard says.

“Change can be scary, but it is important to remember that change and new technology usually end up improving our lives significantly,” he continues.

Therefore, Element Logic has user-centricity at its core to make the transition to automation as easy as possible. Our team of experts design the best solution for your needed level of automation, not just what is considered the fully-scaled industry gold standard.

**Increase your flexibility with AMRs**  
Element Logic recently partnered with



“We never recommend implementing technologies and automation just for the sake of it. For the customer, there always needs to be a clearly visible and solid business case as well as a positive return on invest (ROI) behind it.”

– Timo Eberhard, Head of Digital Transformation at Element Logic

Addverb to include autonomous mobile robots (AMRs) to our automation solutions. AMRs are robots that can move around and transport goods inside a warehouse without being overseen by an operator or limited to a fixed path.

AMRs bring a significant advantage by enhancing the flexibility in the goods flow and are supervised by an intelligent fleet

management system. With AMRs, warehouse workers can remain stationary while the robots autonomously transport the goods to their required location.

Each robot defines its best route through the warehouse in real-time. If an obstacle is detected, the AMR adjusts its path to ensure uninterrupted operations.





# Online pharmacy use piece-picking robot with AutoStore



Pär Svärdson  
CEO, Apotea

**When Apotea, a leading online pharmacy in Sweden, set a goal to provide the best customer experience in the industry, fast and accurate deliveries were crucial to accomplish the objective.**

With 50.000 orders being shipped every day, the need for automation was evident. Apotea thus decided to invest in its future with automation that handled the entire workflow – from inbound

to outbound delivery. The solution includes an AutoStore system, eOperator and additional functions delivered by Element Logic.

eOperator is the world's most advanced piece-picking



robot. Through machine learning the robotic hand automatically selects the best way to pick an item from AutoStore, increasing order capacity, goods handling, and delivery time.

“Our 24-hour operation is now exceptional. It is faster, cheaper and makes us more productive,” Pär Svärdson says.

Svärdson is the CEO at Apotea and very pleased with the outcomes of the automated warehouse. His satisfaction is, however, not

limited to the increased productivity only. He has also observed how the automation has significantly improved the work experience for his warehouse employees.

“This is the first job for many of our employees. Shifting from manual lifting of boxes to acquiring knowledge about advanced technology and operating robots enables them to develop a unique and useful skill set for the future,” he explains.

Experience automation firsthand  
- take a look at Apotea’s automated workflow!

Watch the  
video here





# Warehouse automation in 2023



Sutharshan Nadarajah  
Technology Director, Element Logic

**Currently, order picking is the most automated process in most warehouses.**

“The goal is to make warehouses fully self-managed by 2030.”  
– Sutharshan Nadarajah,  
Technology Director at  
Element Logic

A self-managed warehouse is achieved when all processes are automated with artificial intelligence. In

a self-managed warehouse humans work as robot supervisors and can focus on business areas where human skills and creativity are vital. The human/robot synergy will still be crucial for success, but robots will contribute to more processes than today.

Nadarajah explains that the next step to achieve a fully self-managed warehouse is to perfect the pick & place technology in eOperator to become as autonomous as possible.

The robot arm (eOperator) learns by experience. Today, it can pick orders in different shapes and sizes. In the future, the technology will learn how to accurately putaway incoming inventory and handle returns.

Especially return handling can be complex in eCommerce. What product is it? Is it damaged? Is it mislabeled? Using robots and machine learning to do these repetitive tasks will free up significant resources in a warehouse while giving life to new meaningful tasks.

“Automating the entire return handling workflow is a priority at Element Logic,” Nadarajah says.




A robotic arm with a gripper is shown in a warehouse setting. The gripper is holding a small object. The background is a blurred warehouse with red shelving units and white boxes. The text is overlaid on a red and white background.

## Same principle as in Tesla self-driving cars

Our pick & place solution eOperator uses the fleet learning principle to constantly learn how to make the solution as autonomous as possible. This means that our technology uses the cloud to learn from other warehouses 24/7.

Fleet learning is a well-used principle in the tech industry. For example, Tesla is using this principle to make its fleet of cars able to make decisions while driving on autopilot. When a vehicle approaches a new traffic situation, the computer will upload the driver's action to the Tesla database. If several cars safely pass the same traffic situation, those actions are whitelisted.

This is extremely valuable, real-world data when making safe, self-driving cars.


 Bins picked today

Current  
**2558**


Part 1	341
Part 2	487
Part 3	848
Part 4	454
Part 7	418

 Bins picked today

2578

 Handling time

System handling time

 Bins

# A data-driven future

**“We also have grand plans for our data platform, eLogiq, in the future,” Nadarajah says.**

Today, eLogiq collects, integrates, and processes data from multiple sources to provide valuable insights into operations and trends.

Element Logic aims to leverage this valuable data to offer our customers even more data-driven services.

By 2025, eLogiq is set to integrate its

intelligent features with Element Logic’s warehouse control system, eManager. For instance, this will enable the system to notify a port operator when they need to relocate to another section of the warehouse to prepare for an imminent delivery.

“Intelligent warehouse operations will give warehouse workers fewer surprises and less headaches,” Nadarajah says.





# Robots save lives

**Warehouses are not the first place where AI executes repetitive tasks more efficiently than humans. One of the most important uses of AI is in healthcare, where it saves lives.**

One instance of AI application in healthcare is in diagnostics. Typically, physicians and specialists evaluate images such as X-rays, MRIs, and CT scans manually, which can be time-consuming and prone to errors due to human limitations and potential oversight of crucial details.

Using AI-based models, medical personnel

can detect even the slightest sign of every known illness. In addition, AI and machine learning make it easier for hospitals to plan their resources more efficiently, resulting in shorter waiting lists and better use of money.

AI and new technology also make it possible to perform robot-assisted surgeries where the robot uses surgical tools to complete



lifesaving procedures. The medical robots have integrated cameras to allow surgeons to control the process remotely.

## **Robots also contribute in:**

### **Education**

AI can map out and create a personalized and efficient learning path for each student. You also find robots acting as teaching assistants or tutors in classrooms.

### **Banking and Finance**

In an industry known for large quantities of paperwork, AI reduces the time spent on documentation to a minimum. Chatbots also free up resources in customer success teams.

### **Agriculture**

In modern agriculture, automatic seeders can sow large areas without human interference. AI-fueled machines can plant, fertilize, cultivate, monitor, and harvest crops. Pre-programmed drones watch over the fields, detect possible problems, spray weedicide, or even remove moisture from ripe berries after heavy rain.

### **Transportation**

We have talked about self-driving cars, buses, and trains for decades. Now, it is becoming a reality. AI collects data from radars, GPS, cameras, and cloud facilities to navigate safe traffic routes.

### **Space**

We have yet to send humans to other planets. However, with AI-fueled robots acting as our eyes, ears, and hands, we can explore areas we have never been able to reach earlier.

### **Our everyday life**

The presence of AI and robotics in our daily lives is much more significant than many people realize. From services like ChatGPT, smart homes, smartphones, and robotic vacuum cleaners, to upcoming technologies that will help with household chores such as shopping, cooking, and washing, AI is transforming the way we live. AI will also allow older people to maintain their independence and live in their homes for a longer time.

# The key to growth

AI and robots do not replace humans. Instead, they enhance our abilities and allow us to perform our jobs more effectively while freeing up time and resources, whether you work as a doctor, teacher, farmer, or warehouse worker.

Adapting to new technology and collaborating with robots allows for increased order processing and productivity, enhancing the daily operations within a warehouse.

At Element Logic, we help customers understand and use this new technology to stay competitive and win new customers.

We are a technology and automation company. As pioneers in intralogistics technology, we specialize in optimizing the collaboration between humans and robots in warehouses.

With war, pandemics, natural disasters, and inflation affecting the market, you need to be flexible and able to scale your operations up and down accordingly. All while meeting the increasing customer demands for fast deliveries and zero patience for errors.

We genuinely believe that automation with a combination of our technology and software is key to staying competitive, growing, and winning new market shares.

It is important to acknowledge that employees expect greater job satisfaction and a healthy work-life balance. Automating repetitive tasks is more than just nice to have. It is necessary to slow down the turnover rates in intralogistics.

I am confident that integrating warehouse robots into your workforce alongside human employees would be a beneficial decision. The robots are highly reliable, functioning with optimal efficiency around the clock, without making mistakes or needing sick days, and can assist their human counterparts in tackling other valuable tasks.

I wish you all the best on your journey to a self-managed warehouse,



Nikolaj Bjørn Eriksen  
Managing Director  
Element Logic Denmark



**Element Logic is a technology company that optimizes warehouses for customers to gain a competitive edge.**

The company was founded in 1985 and is headquartered in Norway. We operate worldwide and is the world`s first and largest AutoStore-partner. Element Logic offers its customers automated robotic solutions, software, and consulting services. Total revenue for 2022 was EUR 490 million.

For more information go to [elementlogic.dk](https://elementlogic.dk) and follow us on LinkedIn, Facebook and Youtube.

**ELEMENT**  
LOGIC

[elementlogic.dk](https://elementlogic.dk)