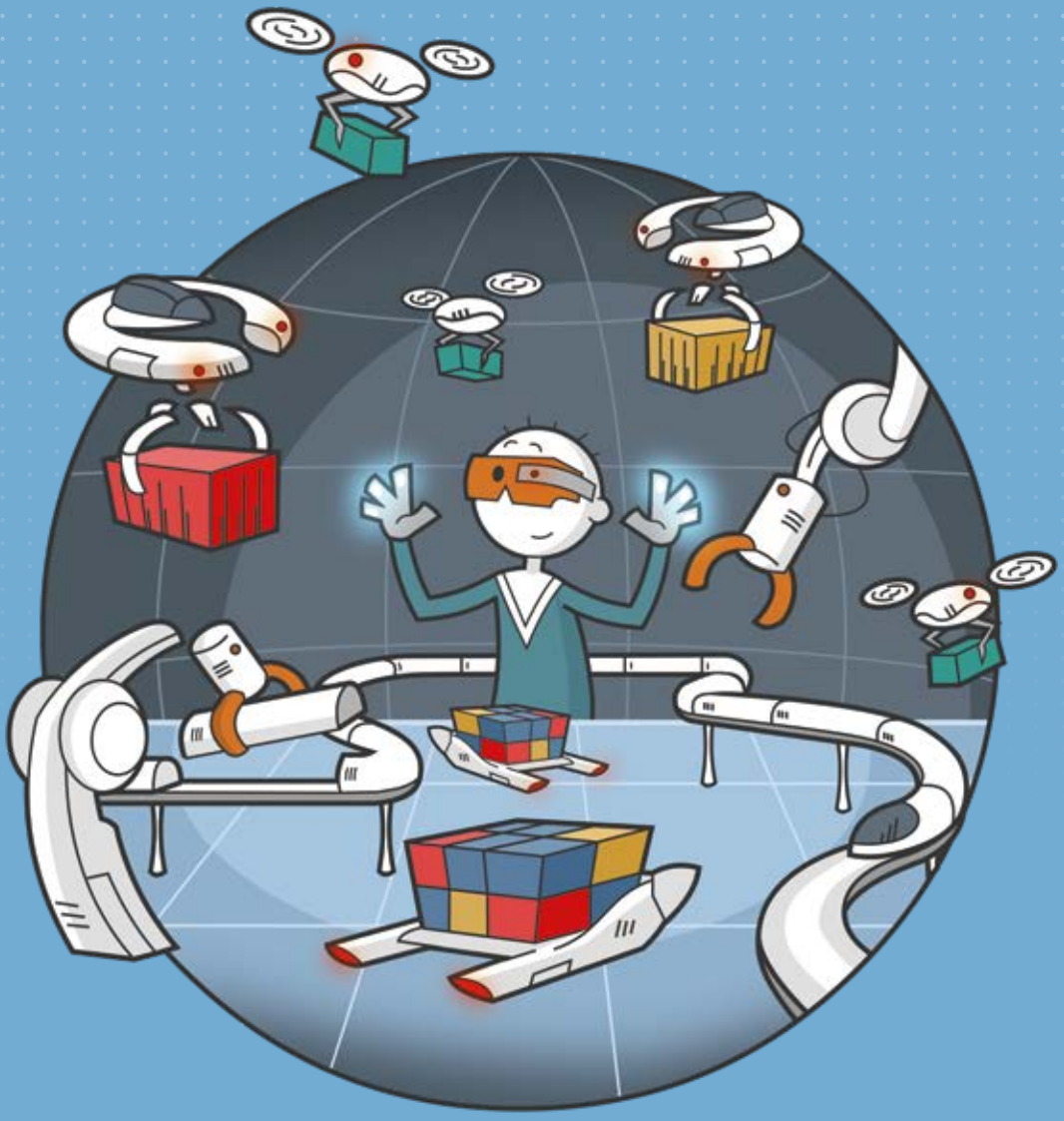
ISSUE 56

ROI DIALOG

LOGISTICS 4.0

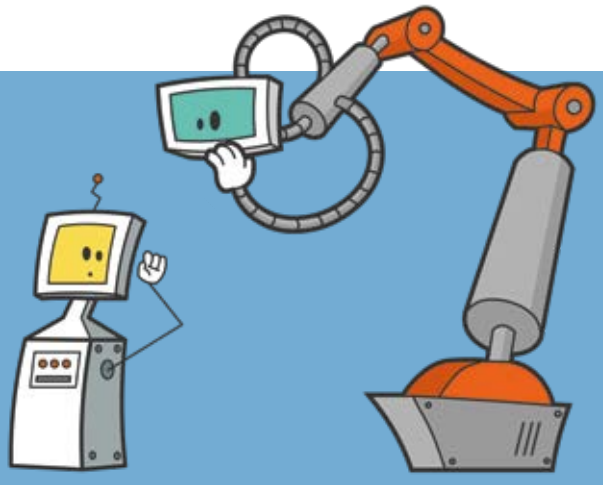
INSIGHT INTO THE COCKPIT OF THE FUTURE



ROI
MANAGEMENT CONSULTANTS

LOGISTICS 4.0

CONTENTS ROI DIALOG ISSUE 56



» The world is an aggregate of facts, not things," wrote Ludwig Wittgenstein in 1918. Those who find this type of abstract logic too complex, can take a look at logistics in 2018 instead. They may see some German SUVs outside the factory gates waiting to be shipped. Pretty massive and impressive THINGS ... ... but not FACTS that can be summed up to the world.

By Hans-Georg Scheibe,
Management Board,
and Prof. Dr.-Ing. Werner Bick,
Chief Representative,
ROI Management Consulting AG

LOGISTICS 4.0

INSIGHT INTO THE COCKPIT OF THE FUTURE

Things get even more exciting when there are no more factory gates. Or no factories altogether. Welcome to Logistics 4.0!

The Wall has to Go

The act behind the action, the added value, not only takes place in Munich, Stuttgart, Wolfsburg or Zuffenhausen. It starts somewhere in the ore mines of Asia, in the IT labs of California, or the rubber plantations and leather workshops in Africa. And of course it does not stop at the factory parking lots. Because that's actually where it really starts, with the added value. Mind you, even Wittgenstein would obviously have been aware that raw materials are not mined inside the factory premises, but delivered to the factory gates. Things get even more exciting when there are no more factory gates. Or no factories altogether. Welcome to Logistics 4.0!

Traditional factories are process circuit breakers - with stone, glass and metal interfaces. Smart factories are part of a holistic, horizontally and vertically integrated value creation process that separate themselves from the rest by eliminating these interfaces - and thus physical and digital boundaries. The consequences of this change are demonstrated in the planning centre of Logistics 4.0.

Suppliers merge with customers

Of course, the absence of factory gates does not mean that suppliers stop delivering goods. Rather it means that the role of suppliers is fundamentally changing. The walls of the traditional factories also mark the boundaries and limitations of ownership and responsibility: The supplier delivers his goods - and is out of the game. In the smart factory these boundaries are drawn virtually - if at all. An example of this are Supplier Managed Inventory concepts (SMI), in which the supplier takes over the management of his inventory in the customer's warehouse, or even remains the owner of the goods until they are removed for delivery (consignment warehouse).

These methods, some of which have been known for many years, are being significantly expanded in the context of Logistics 4.0: Thus, even processes are conceivable in which the suppliers integrate entire modules in the end products without actively involving the customer in the process at all. The transfer of ownership, payment transactions and even the processing of taxes and duties can be fully automated and flexible, for example, through the use of smart contracts, one of the most promising applications of blockchain technology.

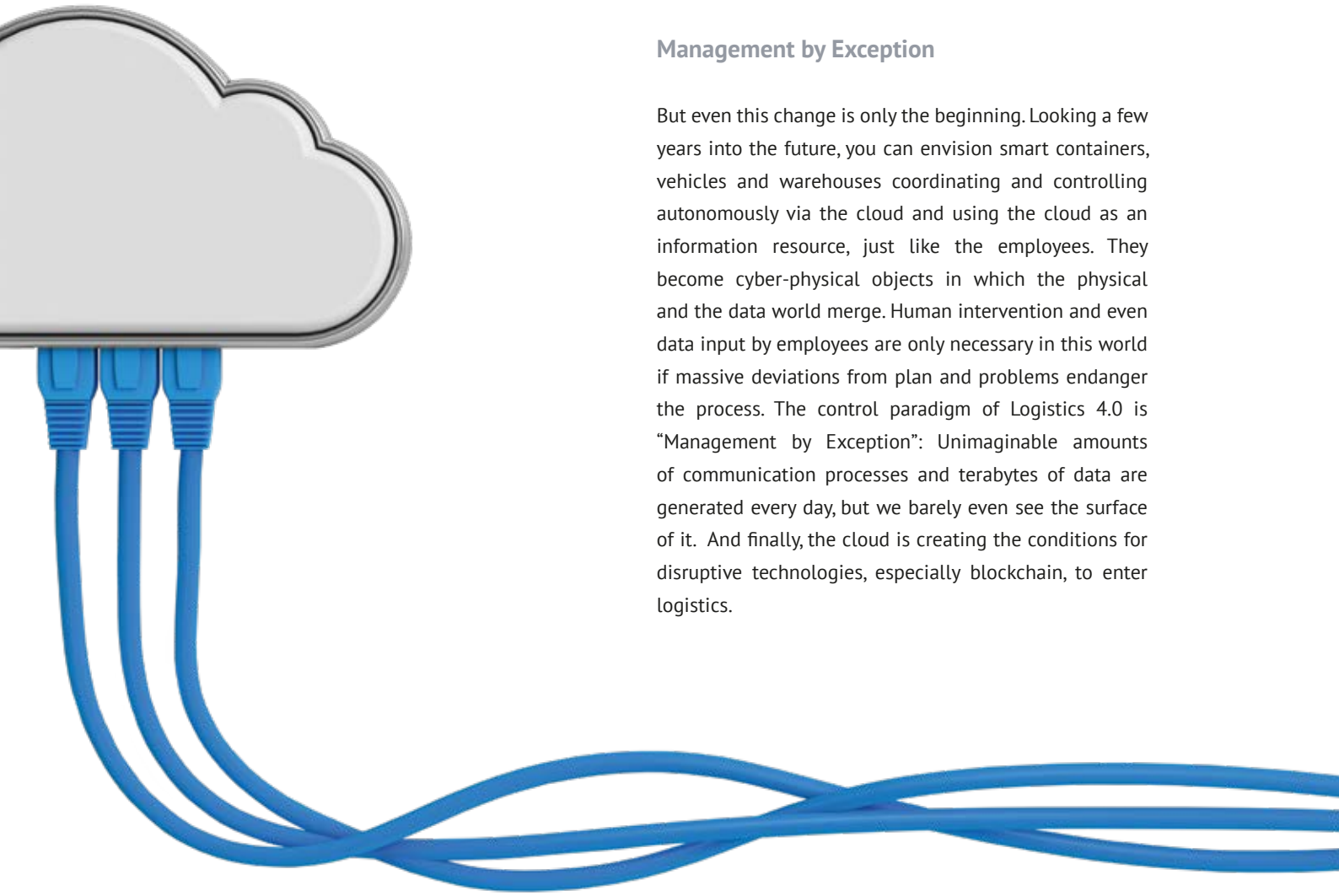
Transfer of ownership and payment transactions can be fully automated through smart contracts.

Logistics from the cloud

The prerequisite for this is the corresponding design of the information flows within the value creation network. The industrial sector has been using electronic data interchange (EDI) for over forty years. However, until a few years ago only very creative spirits would have spoken of an information flow. Expensive IT solutions, missing standards and complicated connections were not the only obstacles. Progress was also obstructed by the fact that the communication consisted of nothing but 1:1 connections that were linked in a very laborious and error-prone way.

This situation changes radically with centralized data management. The adaptation of cloud technology means a real turnaround for logistics. For the first time, information can be merged easily, securely, cheaply and in real-time and processed via common front-ends. The cloud stops the system from growing uncontrollably and pushing data laboriously from bottom to top. It enables real cooperation of all partners in the value chain.

Cloud technology means a real turnaround for logistics. It enables real cooperation of all partners in the supply chain.



Management by Exception

But even this change is only the beginning. Looking a few years into the future, you can envision smart containers, vehicles and warehouses coordinating and controlling autonomously via the cloud and using the cloud as an information resource, just like the employees. They become cyber-physical objects in which the physical and the data world merge. Human intervention and even data input by employees are only necessary in this world if massive deviations from plan and problems endanger the process. The control paradigm of Logistics 4.0 is "Management by Exception": Unimaginable amounts of communication processes and terabytes of data are generated every day, but we barely even see the surface of it. And finally, the cloud is creating the conditions for disruptive technologies, especially blockchain, to enter logistics.

The Non-Warehouse

The counterpart of information processes in logistics is physical flow. Logistics means movement – storage means standstill. The fact that these two do not go hand in hand, is obvious. Meanwhile, logistics has overshadowed the warehouse. Ideally, with just-in-sequence concepts, a good logistics structure ensures that its flow gets by without a warehouse: direct installation of parts makes inventory unnecessary. The parts demand and delivery time are dictated by the production.

Logistics means movement – storage means standstill.

However, if stocks are unavoidable, for example, because production and planning differ and the sequential delivery would be too expensive, it will at least be kept to a minimum. One example is the use of mobile warehouses, i.e. trailers that drive parts directly to the next stations, so that the amount of interfacing is minimized. Another example is the autostore concept, in which a warehouse is physically compressed to a maximum: It resembles a highly structured Rubik's Cube, on whose surface self-driving vehicles are positioned that can accept and deliver goods.

Ants against the central office

The integration of value creation networks also requires new control mechanisms. Because the absence of "process circuit breakers" and buffers also causes risks and shocks to propagate throughout the entire chain. In order to achieve high stability and flexibility of processes, Logistics 4.0 relies on the decentralization of these processes. This makes strong ERP systems and central control stations largely superfluous: Machines and transport systems increasingly communicate with each other independently and notify about material demands at an early stage. They compete for contracts with the automatic agent system, which distributes the tasks according to a predefined list of criteria. Realistically though, even this automatic "dispatch centre" is no longer needed. Like an ant colony, collective intelligence systems will decide within the collective who can do the job best.

Presumably, this revolution will also be distinguished by doing more than merely creating new solutions, new forms of value creation and rationalization. The digital transformation in logistics will also bring with it new forms of challenges and problems whose scope we still can not assess today. These in turn will require their own solutions. Therefore, I'm curious to see how long it will take for us at ROI DIALOG to offer you an article about Logistics 5.0.

Powerful ERP systems and central control centres are superfluous in Logistics 4.0.

From Supply Chain to Supplier Network – Elements of Logistics 4.0

Bimodal Supply Chains

Reserve Logistics

Same Day Delivery

Home of the Logistic Superstars

LEGENDE

Information flow ••••••

Ownership lines ——

Flow of goods - - - - -

Smart Contracts &
Blockchain Technology

Data Models

ERP

PREDICTIVE
ANALYTICS

MES

STATION:
PLANNING
CENTER

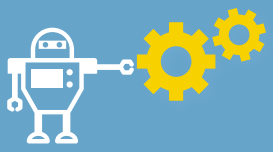
Management by exception
instead of data explosion

Decentralized Decision Making
& automatic agent systems

Home of the
Blue Collar Cyborg

Smart Wearables

Human Machine
Interfaces



CLOUD BASED
LOGISTICS MANAGEMENT

STATION:
THE LAST
MILE

STATION:
SMART
FACTORY

Supplier Managed Inventory (SMI) &
Consignment Stocks

No Touch Logistic/
Just-in-Sequence manufacturing

STATION:
TRANSPORT

STATION:
WAREHOUSE

E-Trucks

Green Logistics

Efficient use of
cargo space

Platooning

AutoStore

Cobots & Picking Robots

Cellular/Collective Intelligence Shuttles

Smart Bins, Racks & Boxes

Hubs2Move

STATION 1

BLUE COLLAR CYBORGS

By Dr. Wolfgang Keplinger,
ROI Management Consulting AG

In the smart factory, much of the information from day-to-day business needs to be available in real time. Human machine interfaces, HMIs for short, make this possible. For example, wearables or interactive assistance systems help with order picking, assembly, production, service and maintenance tasks, or employee training. We are introducing particularly useful HMIs that make manufacturing and logistics faster, more flexible and error-free.

Headsets

Headphones with built-in microphone are probably the best-known and most widely used interactive assistance system in logistics today. Their main application is pick-by-voice, in which the order picker is guided by acoustic announcements to the next article to be picked up and confirms the execution by voice command.

Smart Glasses

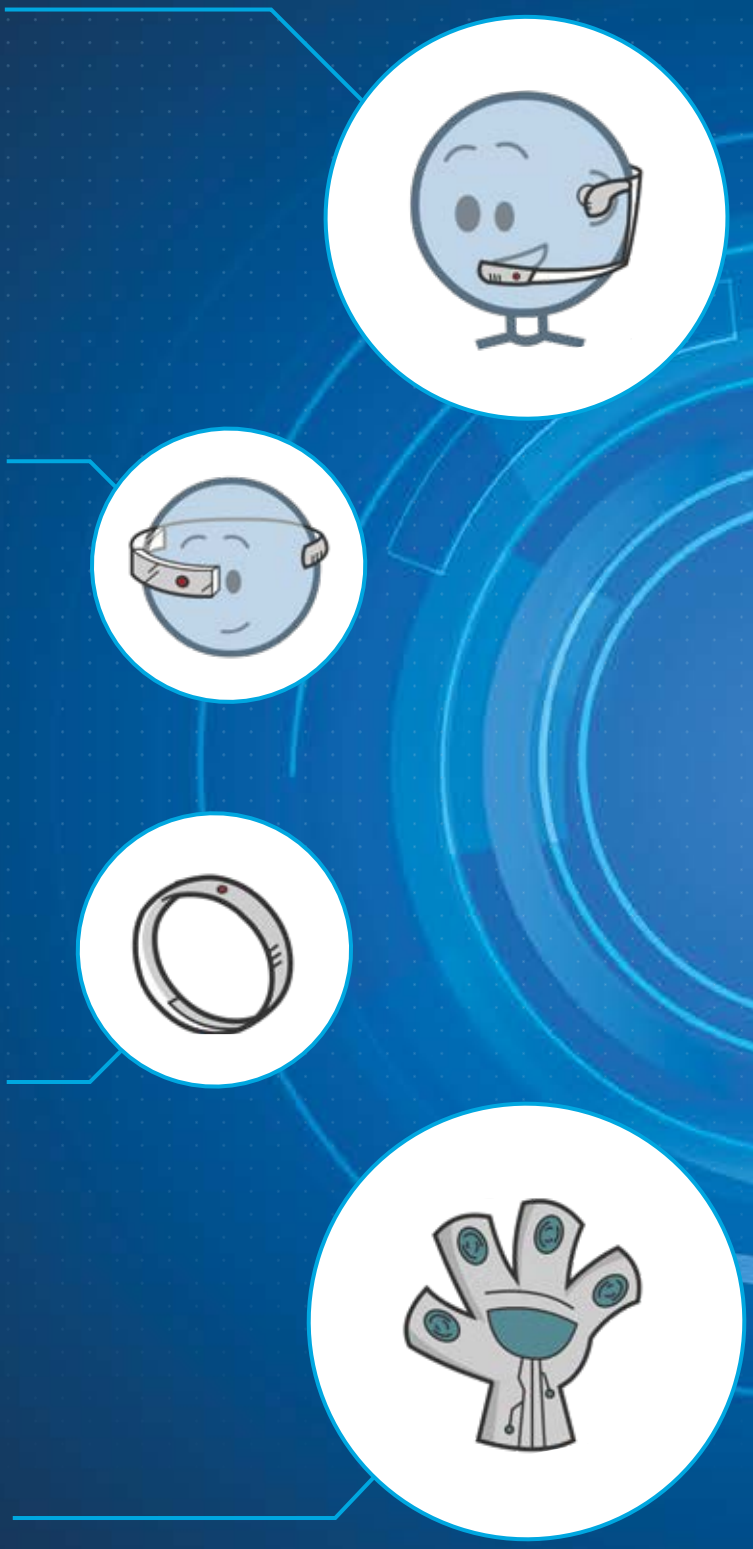
Smart glasses project additional information via a transparent display or laser projection into the field of view. For example, they show the picker how to get to the next article, how many pieces he should take and allows him to confirm the execution of the task by scanning the article barcode. Some companies are already working on transferring the functionalities of smart glasses to contact lenses, so-called smart contact lenses. According to current projections, these lenses should be approved and available on the market some time in 2018/2019.

RFID bracelets and sensor bracelets

An RFID transponder is integrated into a bracelet, with which the user is uniquely identified. This way, machines can be set to the height of the user automatically or the next displayed steps can be adjusted to the skill level of the employee. It may also be granted rights to operate certain systems or to carry out specific repair. The execution of critical work steps can be documented, along with who has assembled, tested or released a specific product.

RFID and wired gloves

An RFID glove is equipped with an RFID reader for reading data from RFID transponders. This leaves the hands of the user free and reposting of the picked goods occurs more or less automatically. Regardless of whether goods are being moved from the shelf to the order picking cart, or from there to the packaging or the shipping pallet - the scanning step is no longer necessary. The wired glove, on the other hand, is a 3D input device that, in conjunction with virtual reality, enables flexible and easy detection of specific arm or finger positions or the determination of the position and orientation of the glove relative to the environment. This enables VR applications or controls robots.



Magic Shoes

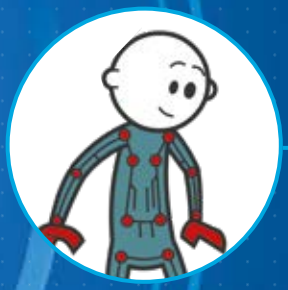
Microchips incorporated into shoes measure and transmit data. They enable the user to control machines by gestures with the feet, for example, but in return they also receive (warning) signals through vibration of the chip.

NFC rings

A ring contains a transponder, which communicates via NFC (Near Field Communication) with the surroundings over short transmission distances. This unlocks systems or smartphones, opens doors or access controls, and prevents order picking errors.

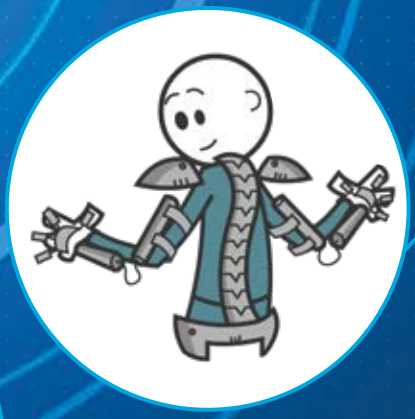
Smart watches and forearm computers

Smart watches are mini-computers for the wrist, which are usually linked with a mobile device. They collect information from the person wearing them (e.g. the distance travelled) or display work orders. In addition, smart bracelets project image signals from a handhold directly onto the forearm of the user. The monitor is then operated directly on the skin.



Motion Capturing Clothes

Sensors integrated into the fabric fibres measure the wearer's movements and generate data about the wearer. Among other things, the objectives of this HMI group are to improve the health of workers, which in turn should lead to longer careers and to a reduction in posture-related or accident-related absence from work.



Exoskeletons

In addition to health and rehabilitation applications, there is a growing number of companies offering exoskeletons to assist workers in heavy lifting or handling operations. Panasonic, for example, has developed an assist suit that supports logistics employees in the daily lifting processes of parcels and thus relieves the strain on the lower back.

Today's cutting-edge HMIs are impressive. However, they are merely intermediate steps on the way to a truly smart world, which is defined by „ambient computing", a ubiquitous, but not physically perceptible intelligence:

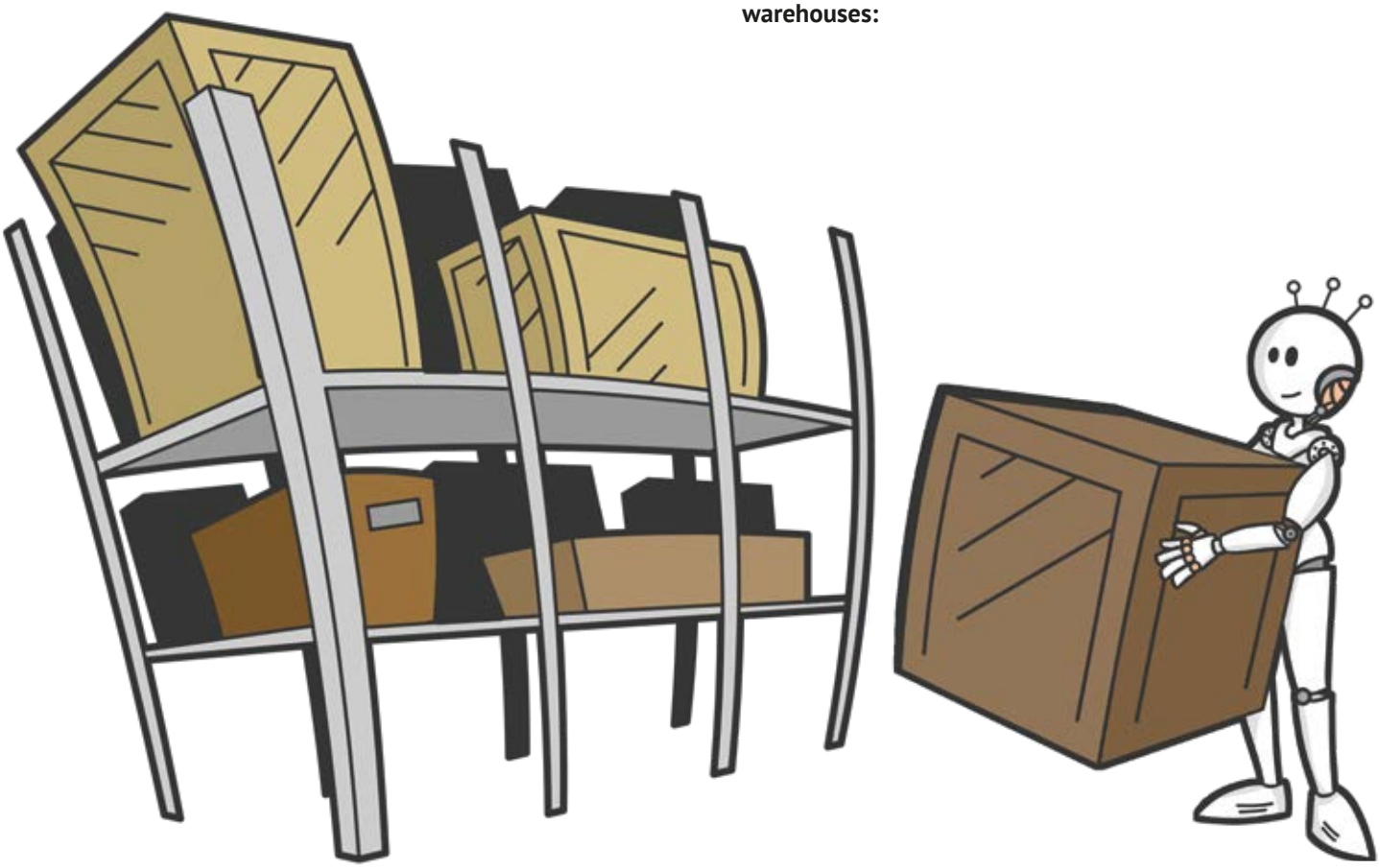
„Compared to what's coming, they are like the Commodore PET or those huge car phones in old movies ... We are a long way from the invisible, omnipresent computer in Starship Enterprise." Walt Mossberg

STATION 2

THE DESERTED WAREHOUSE

By Dr. Wolfgang Keplinger,
ROI Management Consulting AG

Warehouses and distribution centres of the future are more efficient, more reliable, faster, smarter - and, above all, deserted. Because robots are now so cheap and energy efficient that they have almost completely displaced the people there. What's more, they change the way people work there. The number of work steps is no longer key for the efficiency of a process - the operating costs of the individual robot is. The almost unlimited availability of robotic work is thus used to leverage huge efficiency gains and forever changes the look of the warehouses:



Dynamic localization

Warehouse 4.0 will know dynamically, in real time, where the materials/articles are currently located - whether in intake or already on the way to the customer. The use of RFID and beacons then allows us to use Smart Boxes, Smart Bins and Smart Racks, with which any material can be localized at any time. If the products themselves become smarter, we no longer even need the support of "logistics RFIDs" because at that point the scanners in the warehouse will communicate directly with the smart products. With further development of known localization technologies (e.g. DGPS or UWB), methods such as geofencing will also be used within the warehouse in the future.

The almost unlimited availability of robotic work is thus used to leverage huge efficiency gains and forever changes the look of the warehouses.

Automation through Cobots and Picking Robots

Warehouse automation geared towards efficient goods-to-man systems has made considerable progress in recent years thanks to the development of shuttles. Their advantage: they are scalable, with one shuttle per level and aisle, they allow for higher storage/retrieval performance than a storage/retrieval unit (SRU) and are relatively insensitive if a shuttle ever fails. Since the moved masses are significantly lower than those of SRUs, the energy balance of a shuttle system is better than that of an SRU, an important argument in favour of green logistics.

Automatically Moved Racks

Amazon creates efficient nesting order picking with fully automatic robots that bring a whole shelf rack auto-propelled to the picking station by driving under the shelf and lifting it. The benefits for Amazon: The lack of travel time yields a 50% to 70% increase in efficiency for the company. Further advantages are the increase in storage density (articles stored per unit area), scalability of the system, insensitivity in case of failure of a robot, and low energy consumption. Besides robot manufacturer Kiva, which has been acquired by Amazon, Swisslog also offers a similar, highly efficient system for e-commerce providers or mail order companies with its Carry Picker.

Short market cycles and volatile demands are forcing companies and logistics service providers to design their warehouse hardware in a standardized, scalable and flexible manner in the future.

Drones in the Warehouse

Drones performing the inventory in the warehouse no longer surprise anyone today. But where drones fly through the warehouse today and activate the RFID transponders of the stored products with an RFID reader, no drones will be heard in the future. Dynamic localization will make these deployments redundant. However, drones have a great future as a means of transport: In Warehouse 4.0, they will provide fast and direct exception express transport within a building, or even on short-haul routes. In this case, a drone could provide the much needed last link in a logistics chain to complete as extensive customer supply or start a production. Also conceivable is the use of drones in a clearly space-limited and outlined storage area, for example, to perform sorting tasks (from a track in KLTs or on pallets).

Cellular/Collective Intelligence Shuttles

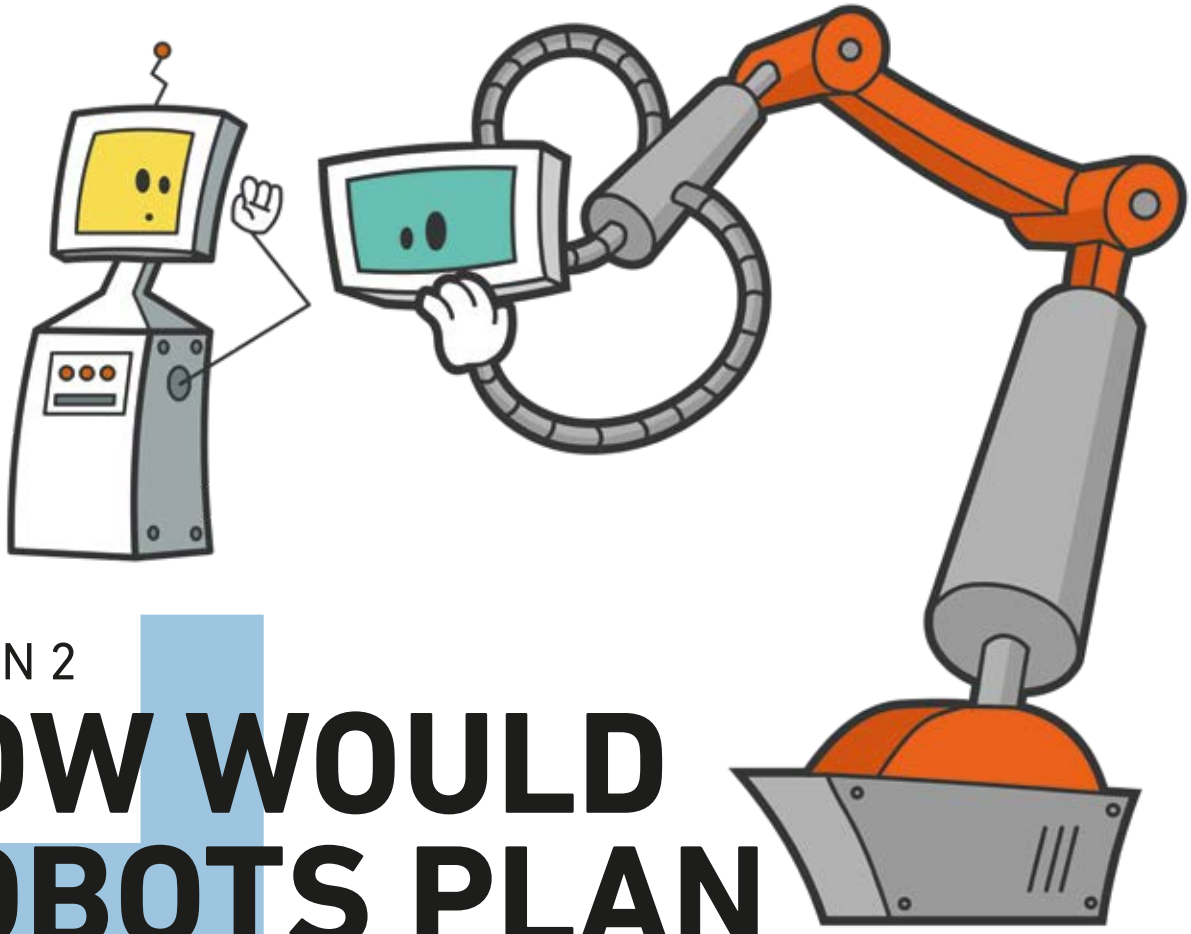
Transporting within the warehouse, from the warehouse to the dispatch area or from the warehouse to production or back again are handled more and more by AGVs (Automated Guided Vehicles). In recent years, the vehicles have become smaller, more reliable, more autonomous in their control, more cost-effective and safer, and above all, independent of firmly laid out route guidance means such as cables, lines or markings. The vehicles control themselves more and more reliably through laser scanning and alignment to permanently installed orientation marks or by means of camera-based environmental/contour recognition.

While handling or transfer processes between the warehouse shuttles and the AGVs for further transport are still necessary today, in the future the shuttles could also travel to the shelf apron area and deliver the desired material directly to the picking station or into production. This eliminates yet another touch from the intralogistics chain and brings us closer to a „no-/few-touch" warehouse. The first attempts at a collective intelligence-based shuttle system that delivers directly from the shelf to order picking stations or production took place several years ago by the Fraunhofer Institute and Dematic, which made technological differences between racking and autonomous ground operations; but this solution is not yet economical.

Hubs2Move & Virtualization of Warehouses

Short market cycles and volatile demands are forcing companies and logistics service providers to design their warehouse hardware in a standardized, scalable and flexible manner in the future. This is the only way warehouses can be adapted to the changing needs of customers. The next steps in this direction will then be to make the warehouses more portable (transfer from location A to location B) and more virtual. In this case, the physical transport of products could be largely replaced by a „transport of information" over the internet. The customer then creates the final products himself by means of additive manufacturing/3D printing at the place of need.

The best warehouse is not a warehouse. The „advanced technologies“ are working to fine-tune the last bastions of stacking and layering. Through a mix of LEAN methods, digitalization, automation, mobilization and flexibilisation, the traditional warehouse not only loses its importance, but also more and more any physical substance. The notorious last one to switch off the light will certainly not be human. And therefore probably did not need the light on to begin with.



STATION 2

HOW WOULD ROBOTS PLAN A WAREHOUSE?

By Dr. Wolfgang Keplinger,
ROI Management Consulting AG

Although robots are already used today in many small parts warehouses, it is currently still clear that they were designed for humans. There are long rows of shelves arranged so that workers can easily pass between them and access each of the stored containers as easily as possible. And even if today this task is carried out in most warehouses by automatic storage/retrieval units (SRU) or autonomous shuttles, the basic principle of the shelf warehouse with its open front surfaces, its traffic areas and spaces has changed little over time. But what would a warehouse look like that would not follow the traditional patterns of human operating logic, but instead would be optimized solely for automated operation by robots?

Rethinking the warehouse

The AutoStore system for automatic storage and order picking of small parts from the Norwegian manufacturer Hatteland provides an answer to this thought experiment. Based on the premise of arranging containers as space-saving as possible in the available area, the system breaks radically with the design principles of traditional warehousing: Instead of shelves, the containers are stacked directly on top of and next to each other. Mounted above these stacks is a track system on which autonomous, battery-powered vehicles travel to pick up, rearrange and transport the containers individually to the directly connected ports for goods reception and order picking. This eliminates the usual traffic routes and reduces the distances between the individual containers.

Self-Optimizing Processes

This space gain has its price: Unlike in traditional rack warehouses, KLT containers stored further below in the AutoStore can not be controlled directly, but must first be „excavated“ before the actual picking process. To accomplish this task, several transport vehicles work together independently. Through self-optimizing processes, containers with items that are less frequently used continue to sink downwards, while articles with frequent accesses remain at the top and are thus available more quickly. Advance notice in the order buffer allows for timely restacking, so that the ports are permanently supplied.

The result is a system for automatic storage and picking of small parts, which is designed in multi-faceted ways for radical efficiency increase:

Location:
Due to the extreme compacting of the storage area, the AutoStore system can achieve a space gain of up to 400%. The modular design configuration and flexible arrangement in the room also facilitate integration into existing building structures and thus ensure high scalability with changing capacities.

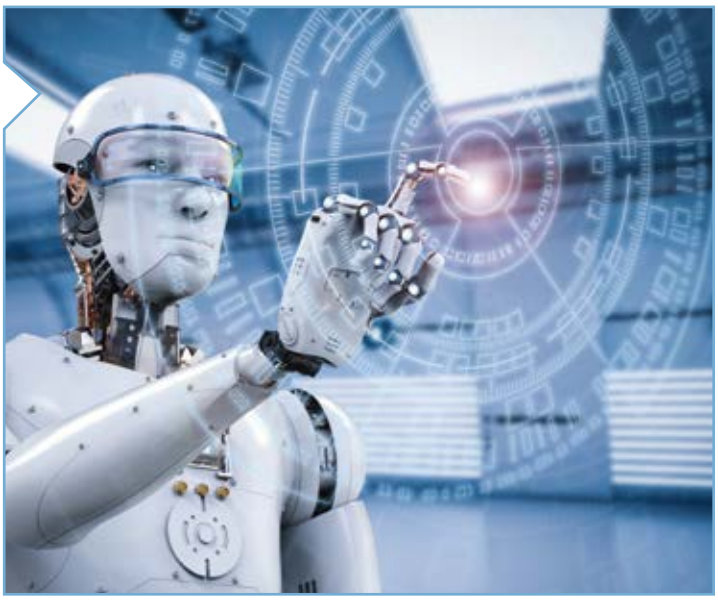
Speed:
The compact arrangement of KLT containers shortens the paths for the transport robots and enables efficient storage/retrieval performance. With an acceleration of 0.8 m/s2 and a speed of 3.1 m/s, a robot achieves about 25 storage/retrievals per hour. By connecting additional vehicles and ports during operation, the overall efficiency of the system can be increased as needed.

Energy:
The vehicles are operated fully electrically and have a module for energy recovery when lowering the containers in a vacated storage space. Their energy consumption is therefore only 0.1 kW/h. When the vehicles are not in use, they drive independently to the charging stations located at the edge of the grid. In addition, power consumption can be scaled by using fewer vehicles in phases with lower throughput.

Reliability:
The parallel use of several vehicles per module reduces the failure risk of the entire system to a minimum. If one robot fails, another one takes over its task. This gives AutoStore up to 99.6% uptime.

Radical increase of efficiency

The AutoStore system is thus not just another evolutionary step in automatic small parts logistics, as was the case with storage/retrieval units or autonomous shuttles before. Rather, this technology is a paradigm shift in which the basic principles of storage technology have been freshly reconsidered. On the one hand, this radical increase in efficiency is possible because robots are not only constantly becoming cheaper but also becoming more and more energy-efficient. On the other hand, this is the first time a warehouse has been designed to be operated and used by robots rather than humans.



STATION 3

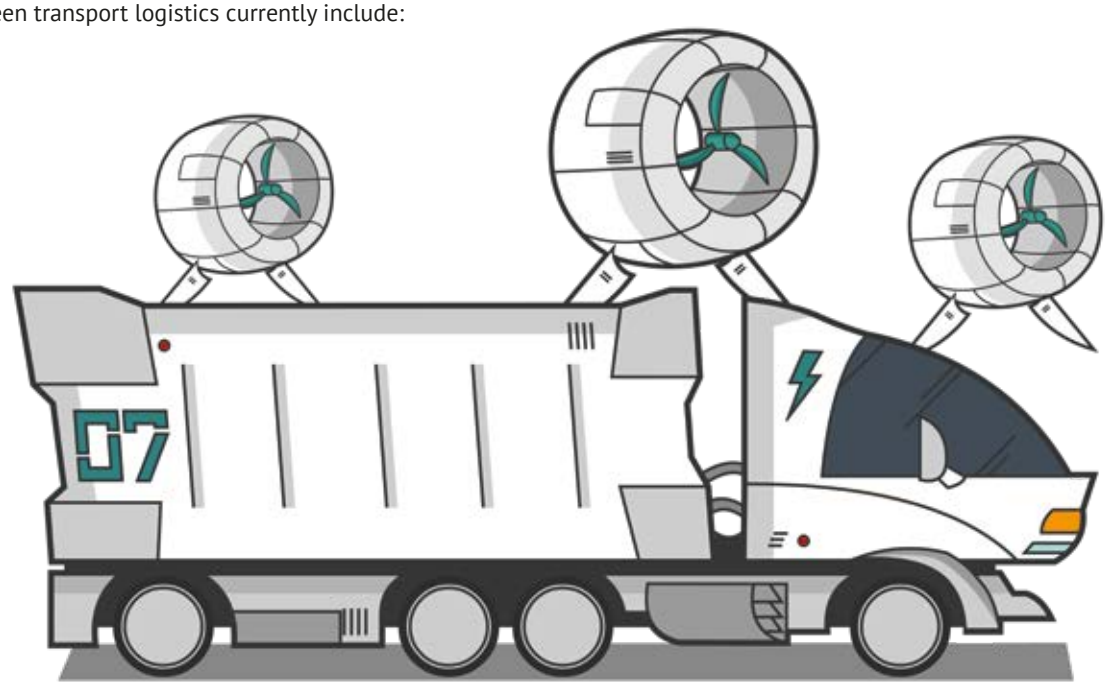
SMART TRANSPORTATION

By Dr. Wolfgang Keplinger,
ROI Management Consulting AG

With the continuous improvement of diesel technology as the world's most important drive technology for lorries, the emissions per kilometre travelled have dropped significantly in recent years, but a non-practice-relevant determination of statutory emissions tests reveal gaps for manipulation or skilful interpretation of the law by the manufacturer. Moreover, the improvements could not offset the effect of the ever-growing route optimization program, despite the today's widespread use of route optimization programs in the freight forwarding sector.

By leaving the Paris Climate Agreement, the US has abandoned the road to green transport logistics, strengthening a backward-looking trend towards fossil fuel use in other nations as well. But the next push towards really green transport logistics can only be expected if the state governments take the environmental goals laid down in the agreement seriously and the legal framework for transport and logistics is significantly narrowed. However, it is good to know that the necessary technologies or solutions already exist or will be ready in the near future. The most important expectations of green transport logistics currently include:

One of the biggest transport problems on the way to reduced CO^2 emissions are the unused but moving cargo bays.



E-transporters in urban space

A pioneer in the field of small trucks and vans in Germany is DHL with the all-electric StreetScooter. Developed in 2010 from a research initiative of the RWTH Aachen Technical University, about 100 employees of the company, now owned by DHL, have been producing this urban delivery vehicle since 2014. In 2016, the 1,000th vehicle was manufactured, and now 10,000 are expected to leave the production line every year, with the end goal, among other things, of electrifying the total inventory of around 70,000 DHL delivery vehicles. In addition, there are already external prospects for the StreetScooter such as municipalities, dealers or craftsmen.

Daimler has been using the Fuso Canter E-Cell since 2014, a light all-electric lorry in everyday use, which went into small series production as Fuso eCanter in 2017. In addition, Mercedes-Benz presented the first all-electric truck for urban heavy-duty distribution transport of up to 26 metric tons and with a range of up to 200 km. This truck went into everyday use testing in 2017 and production could start in 2019/2020. Since the end of 2017 MAN has also been testing an eTruck concept for medium and heavy urban distribution traffic in everyday scenarios at the end of 2017.

The advantages of this e-lorry are obvious: They meet the soon-to-be tougher urban requirements for emission-free driving and allow night-time deliveries in urban areas. With the increasing capacity of new battery generations as well as their continuous drop in manufacturing costs, these vehicles could soon come within range of comparable costs to today's diesel technology. Of course, in the best case scenario, their drive current should come from emission-free wind power or solar/photovoltaic energy.

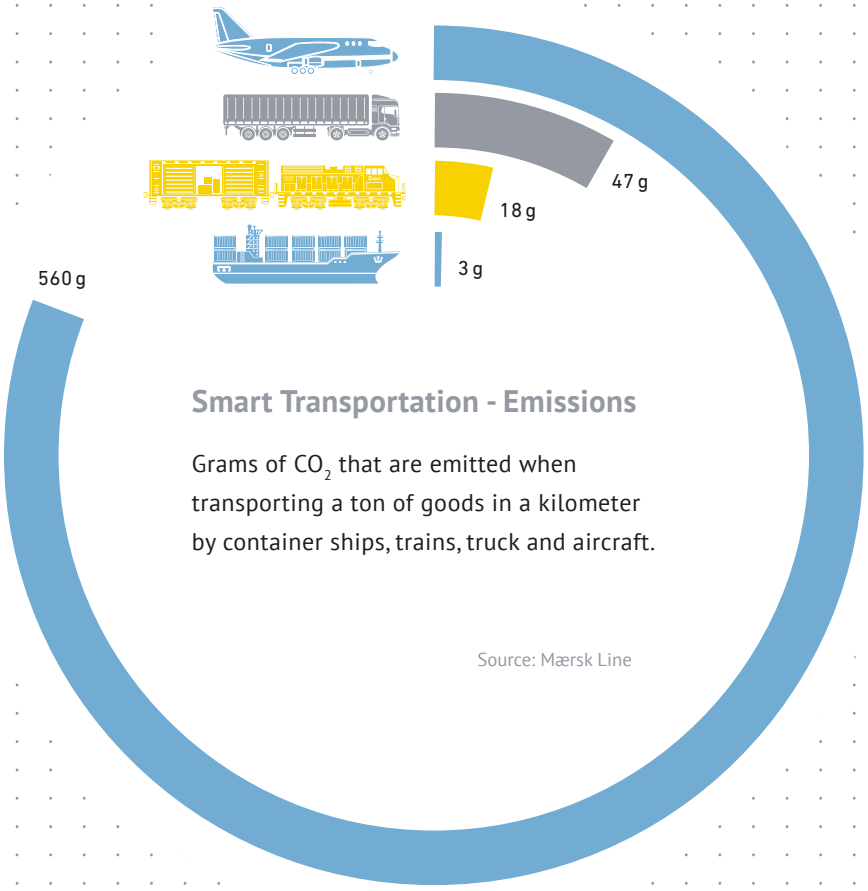
Platooning: sensor-based control of convoys of lorries

Even if the technological leap to pure battery operation is not yet possible for long-distance travel and heavy lorries from 26 to 40 metric tons, there are still interesting technological innovations, especially in the electronic, wireless sensor-based control of convoys of lorries. A study by the Massachusetts Institute of Technology (MIT) showed that closely spaced lorries consume up to 20 percent less diesel and less than half of the motorway surface in normal operation due to lower air resistance. Due to the short steering control reaction time, necessary braking processes can be triggered in just 0.1 seconds, which enables extremely short vehicle distances of only 10 - 15 m (less than the length of a lorry with trailer). Volvo and Daimler have completed their first platooning trials in 2016 and 2017. Just this year, DB Schenker and MAN announced a major platooning practice test in networked truck convoy operation.

Improved cargo space utilization through Big/Smart Data Analytics

One of the biggest transport problems on the way to reduced CO_2 emissions are the unused but moving cargo bays. Of course, with constant demands for even faster delivery times, the cargo volume used cannot be optimized and improved at the same time. But above all, big data analytics can help to make unrealized but anticipated needs more predictable and combinable with current transport processes and to bring together the existing supply of cargo space with the demand at short notice.

Cargo Sous Terrain AG (CST) from Switzerland has developed a fascinating idea with the vision of a holistic solution for logistics. An automated logistics system enables underground transport of pallets and containers. Tunnels connect production and logistics locations with metropolitan areas. In the city, the CST's goods are distributed efficiently and ecologically sustainable. The idea has already found numerous industry and community supporters and shows that cross-company, platform-minded approaches can really bring about substantial improvements in logistics.

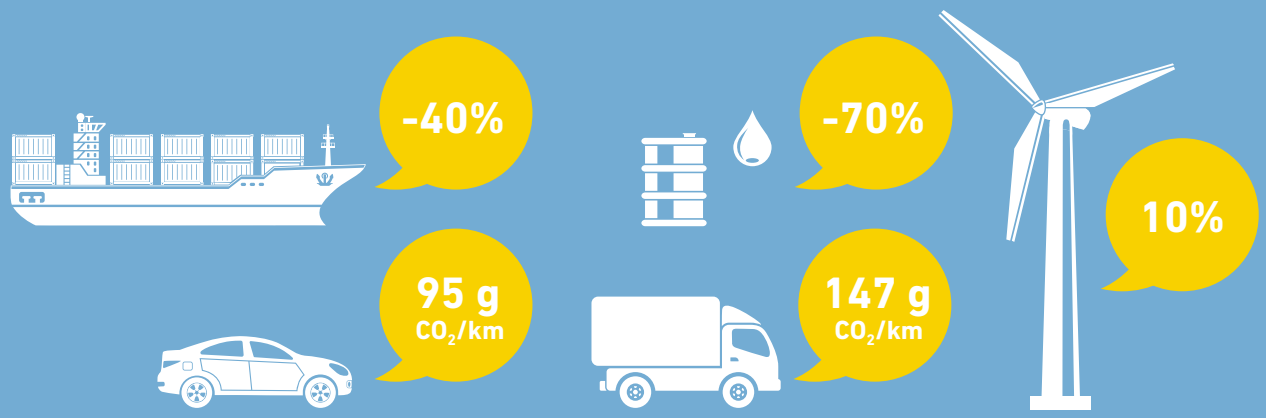


Smart Transportation - Emissions

Grams of CO_2 that are emitted when transporting a ton of goods in a kilometer by container ships, trains, truck and aircraft.

Source: Mærsk Line

Smart Transportation - EU targets for emissions reduction in the transport sector



Reduce ...

international bunker GHG emissions by 40% by 2050, compared to 2005

average CO_2 emissions of new cars to 95 g/km by 2020

transport oil consumption by 70% by 2050, compared to 2008

average CO_2 emissions of new vans to 147 g/km by 2020

For each EU Member State, the share of renewable energy consumed must be at least 10% by 2020.

Source: European Environment Agency (EEA)

STATION 4

BIMODAL SUPPLY CHAINS

By Dr. Wolfgang Keplinger,
ROI Management Consulting AG

Logistik 4.0 is driven by a change in customer behaviour: A new generation of digital natives and smarter (grey) users sometimes operates continuously on the internet, sometimes even on multiple channels at the same time. A specific digital consumer behaviour has developed with them, which is characterized by the desire for individualized, short-term available products.

Logistics Superstars

This development has already spawned new or changed service providers: DHL mastered the turnaround from being a state-owned enterprise to becoming a competitive technology leader, and Amazon is (and has been) putting the customer at the centre of all considerations and creating a new logistics standard based on that model. And Zalando is proving to be the world champion of reverse logistics. One thing is common to all three examples: In all considerations and changes, they focus consistently on the customers and their expectations and align the logistics chain precisely to it.

Same Day Delivery Turns to Commodity

„Customer proximity" is also produced by real-time data on buying behaviour and product usage. Product performance is no longer compared to performance specification, but to the actual expectations of the customer. Logistics top performers want to make it as easy as possible for their customers: Same-day delivery is turning into two-hour delivery; instead of pressing a button, the customer now orders by voice control through a chat bot. And the delivery to the front door is replaced by overnight delivery to the trunk of the locatable car or to another individual delivery point.

Growth Thanks to Bimodal Supply Chains

This intensive customer orientation in the supply chain has led to a serious paradigm shift in the value creation of logistics companies: „Functional silos" from sales, development and operations are a thing of the past; in their place, logistics managers are taking advantage of integrated demand management, replenishment and production. This is the only way for providers of complex technological products, such as smart phones or tablets, to bring new technological solutions to market maturity every year in high-frequency innovation activities. Bimodal supply chains thus enable an excellent cost position within a supply chain. At the same time they support the desired growth through the rapid conquest of new technologies and markets. This simultaneous mastering of two different capabilities (continuous performance improvement and cost reduction on the one hand, and innovation and growth on the other) is what we call bimodal supply chain management.

Innovation Excellence as a New Supply Chain Requirement

The new component of this bimodal supply chain strategy is the rapid development and adaptation of innovations. Previously, logistics was primarily known to improve service and reduce costs. But the new top performers also impress with their operational as well as their innovation excellence. Companies cannot only learn from them how to use bimodal supply chains to create optimal customer relationships. They can also follow the best practices of market leaders in order to

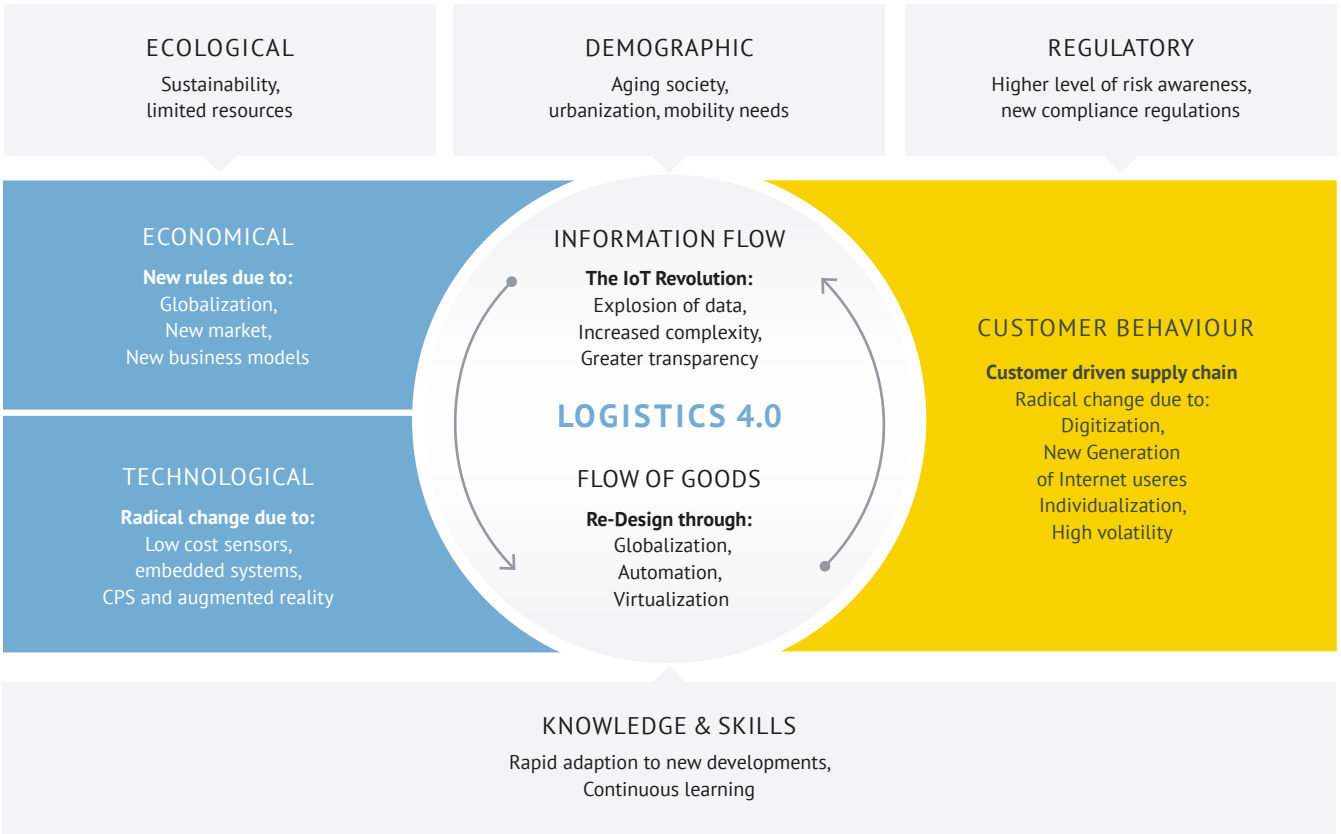
- quickly build up new suppliers;
- explore innovative paths with existing suppliers (co-innovation);
- work together with the development department to design and deliver new product generations in the shortest possible time;
- bring new talents on board with HR and to organize cross-functional collaboration within the company;
- work with IT to develop new software solutions;
- rapidly integrate new acquisitions with M&A.

This simultaneous mastering of two different capabilities is what we call bimodal supply chain management.

When the Package Finds the Recipient

This innovation perspective must not become a chore; instead it should be deeply rooted in the DNA of the company. After all, the customers, competitors and technological possibilities are guaranteed to always be one step ahead of the company's planning. An example: Thinking more in-depth about the possibilities of smart analytics, soon, with the help of transaction data and calendar entries stored on smart phones, the expected shipment can be automatically directed to where we are most likely to be at the earliest possible arrival time of the shipment. The „logistic clockwork" is therefore clearly ticking digitally - and faster and faster in terms of customer orientation.

Driver of Logistics 4.0



RESULTS COUNT.

As an expert in R&D, manufacturing and Industry 4.0, ROI helps industrial enterprises optimise their products, technologies, and production networks, and harness the power of digitalisation for more efficient processes and smart products. Operational excellence and quantitative, sustainable results are the goals by which ROI wants to be measured. For its highly implementation-oriented projects, ROI has received several important awards such as the 'Best Consultant' seal by 'brand eins' and the 'Best of Consulting' by WirtschaftsWoche and earned top rankings in the study 'Hidden champions of the consulting market' of the WGMB.

In order to make the multifaceted topic of Industry 4.0 tangible and effectively usable in corporate practice, ROI runs an Industry 4.0 learning factory in which the technological foundations and principles of digitalisation are combined with the lean production approach and conveyed in a practical way. Together with the trade journal Produktion, ROI has been handing out the 'Industrie 4.0 Award' in Germany since 2013, and since 2017 also in China.

Established in Munich in 1999, the ROI Group employs more than 150 people worldwide in Munich, Stuttgart, Beijing, Prague, Vienna, and Zurich. The spectrum of clients ranges from well-known medium-sized companies to DAX-listed corporations.

SUBSCRIBE NOW TO ROI DIALOG

Use this QR code to access the order form directly.
Or simply click on ROI DIALOG in the navigation bar at

www.roi-international.com

LEGAL NOTICE:
Person responsible for content under German press law: Hans-Georg Scheibe | ROI Management Consulting AG
Infanteriestraße 11, D-80797 Munich, Germany | Tel. +49 (0)89 121590-0 | E-mail: dialog@roi.de
Directors: Michael Jung, Hans-Georg Scheibe

Print: CreativDruck Moosach | Pelkovenstr. 42, D-80992 Munich, Germany
Layout and Illustrations: ALEKS & SHANTU GmbH

www.roi.de